

THE IRON AGE

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Giving Metals a Rust-Proofing Treatment

Developed by Parker Rust-Proof Company
of America — Interesting Equipment
for Sand Blasting Parts on a Large Scale

A PROCESS for the prevention of corrosion in iron and steel has been developed by the Parker Rust-Proof Company of America, Detroit. The process is now being offered on a commercial basis. In addition to the various experimental tests, the process has been used commercially in the past year by some of the Detroit

able resisting surface rather than a coating or a metal plating.

The metal after the process is applied has a gunmetal finish attractive in appearance. Its surface is meshed with a microscopic etching which is said to have adhesive qualities that form an excellent base should it be desired to provide some



In the Processing Department the Metal Parts Are Dipped in Tanks Containing the Rust-Proofing Solution and Are Then Placed on Metal Racks to Dry

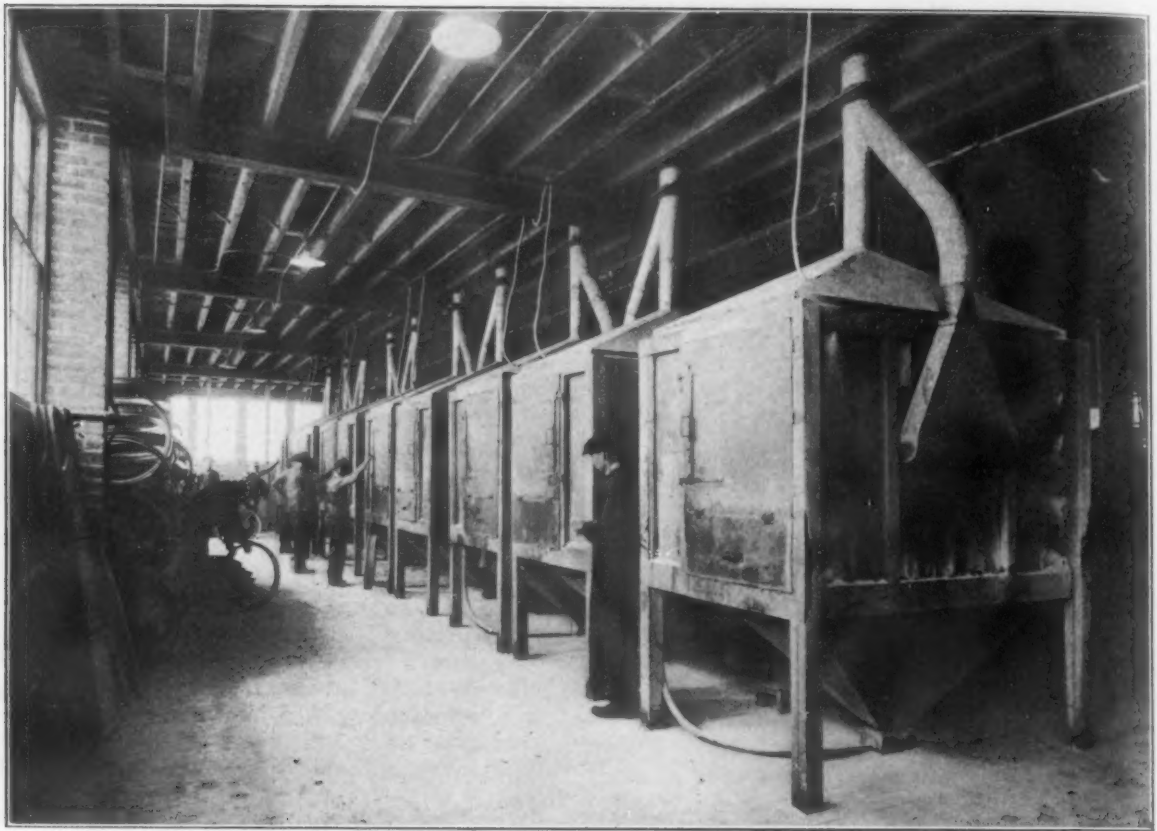
automobile builders and by other manufacturers in metal-working lines.

The process consists of immersing the article to be rust-proofed in a chemical bath heated to 212 deg. Fahr. The basic chemicals in the solution are phosphoric acid and manganese dioxide, these being compounded with other chemicals. In preparing the bath a tank is filled with water and 2 per cent of the compound is added. Before the parts to be rust-proofed are immersed in the tank, the scale is removed either by sand blasting or pickling. They are left in the tank in which the solution is kept at a boiling point from $\frac{1}{2}$ to 3 hr., depending on the metal, or until the effervescence ceases. The parts are then lifted out and dipped in a low-grade oil, the chemical action of the oil setting the process, which is said to be a chemical penetration of the metal that provides a suit-

special finish or color by applying paint, enamel or lacquer. In japanning it is claimed that the same results can be obtained with one coat as with three coats when the metal is not rust-proofed. The company is now working on a process for nickel plating the rust-proofed metal.

The Parker Rust-Proof Company has recently built a plant on Conant Avenue, Detroit, where it will engage in rust-proofing on a large commercial scale. This plant now has a capacity of 100 tons per day and when all the equipment contemplated is installed the capacity will be nearly 200 tons per day. An interesting feature of the plant is its very complete sand blast equipment providing a much greater capacity than is found in most foundries.

The plant includes the main processing building, 60 x 350 ft., the enameling, painting and tank



In Cleaning Small Pieces Preparatory to Treating Them, the Operator Stands at the Front of the Sand Blast Booth Which Is Covered by a Curtain, and the Finished Work Is Removed Through a Door on the Opposite Side

building department in a building, 60 x 300 ft., and a power house, 60 x 160 ft. The offices are in rooms at the front of the main building, but after the erection of an office building at the front, the present office rooms will be used as factory offices. The processing building is divided into two sections, the front, 60 x 192 ft., being the processing room, and the rear, 60 x 158 ft., is occupied by the cleaning department. The rear part of the building is two stories in height.

The processing room is equipped with four tanks, one 7 ft. wide, 28 ft. long and 20 ft. deep, with a capacity of nearly 20,000 gal. The others have a capacity of about 3000 gal. each. Nine more tanks will be installed, giving a tank capacity of 50,000 gal. The tanks are of wood, lined with steel, and have double compartments, a patented feature that is said to eliminate sediment. The small parts to be rust-proofed are placed in baskets and the larger pieces are hung on racks. After being removed from the tanks they are placed on metal racks and allowed to dry before being dipped in metal. The material is handled with a 5-ton electric traveling crane that spans the building. It is the intention to install automatic machines for treating material with soda and gasoline and for oiling it after it is rust-proofed. Continuous processing equipment with conveyors will also be installed for cleaning with sand blast machines, processing and oiling automobile rims. It is expected that with this equipment 4000 to 5000 rims can be rust-proofed in a day by five men.

In the cleaning department there are specially designed hand sand blast booths for cleaning small pieces that cannot be placed in barrels. The operator stands at the front of the booth, this side being covered with a curtain attached to sliding metal doors moving horizontally and allowing the helmet protected operator to move side-

ways during his work. Material is placed in the booth by raising the door shown on one side and is taken out through a similar one opening on the opposite side. Ten of these booths are in use and four more will be installed. Two men are employed in placing the material in the booths and two others remove it after cleaning.

For cleaning larger pieces a Pangborn, two New Haven and a Wadsworth sand blast barrels are used. In addition, there is a large sand blast room, 8 ft. wide and 30 ft. long, for cleaning heavy structural steel and ornamental iron work. The sand blast equipment is connected to four Pangborn dust arresters.

Air for the cleaning system is supplied by three Ingersoll-Rand two-stage compressors, with a combined capacity of 2000 cu. ft. per min. A large compressor with a 2000 cu. ft. capacity will be installed shortly. The compressors are driven by Bruce-Macbeth gas engines ranging from 80 to 150 hp., and a fourth engine is used for operating a generator for supplying light. Two more gas engines, one 500 and the other 150 hp., will be installed. The gas engine jacket water is utilized for heating the buildings.

It is stated that the Parker process has been adopted by automobile manufacturers for rust-proofing various parts and a wide field is expected for it in rust-proofing automobile rims. It is pointed out that by using the rust-proofing process malleable and gray iron castings and steel stampings can be substituted in many cases for brass, aluminum and copper and various non-ferrous metals. It is claimed that the temper of the metal is not affected in any way by rust-proofing. Among other uses, a wide field is expected to be found for the process in rust-proofing builders' hardware, ornamental iron, stoves, typewriters and phonograph parts, barn hardware, metal furniture, electrical work, electric battery boxes, and,

in fact, all metal that is exposed. In experimental work it has been used in rust-proofing anything from a sewing needle to a steel telegraph pole.

In addition to its main plant in Detroit, it is stated that 25 processing jobbing plants for rust-proofing will be maintained in the larger manufacturing centers, some of which will be operated by the Detroit company and others by independent organizations, and small plants will be conducted in smaller towns. The process is licensed to manufacturers who wish to operate their own plants, the necessary equipment and chemicals being furnished by the company.

The Parker Company has a capital stock of \$2,500,000. Clark W. Parker is president and Wyman C. Parker is secretary and treasurer and general manager. The company claims to hold all fundamental United States patents covering rust-proofing as distinguished from iron plating.

Large Track Scale with Plate Fulcrum

The first two-section plate fulcrum track scale ever built, it is said, has been installed by the Pennsylvania Railroad Company at Pitcairn, Pa. It derives its name from the shape of the fulcrum which is formed with a relatively thin central portion connecting the two heavier portions or heads, as shown in the small insert cut. These fulcrums have been substituted for the regular knife edges and bearings formerly employed in track scale construction. The thin portion is relied upon to give the flexibility desired, while the large heads distribute the load on the supporting members by decreasing its intensity and also furnish a ready means for attachment to the levers and supporting stands. The thin central portions are arranged to act in direct compression and are subjected, it is pointed out, to a slight flexure as the weighing beam vibrates and the lever system responds to the condition of the balance. The scale was built by E. & T. Fairbanks & Co. in their factory at St. Johnsbury, Vt. Its development was due to collaboration of the builder, the railroad company and A. H. Emery, Stamford, Conn.

The scale is installed in a concrete pit, measuring 10 x 69 ft. inside measurements. The weighing rail is supported on cast-iron rail stands resting in turn upon steel cross-ties supported on the main girders. The main bridge is constructed of two plate girders, one on each side of the scale, measuring 62 in. in depth from

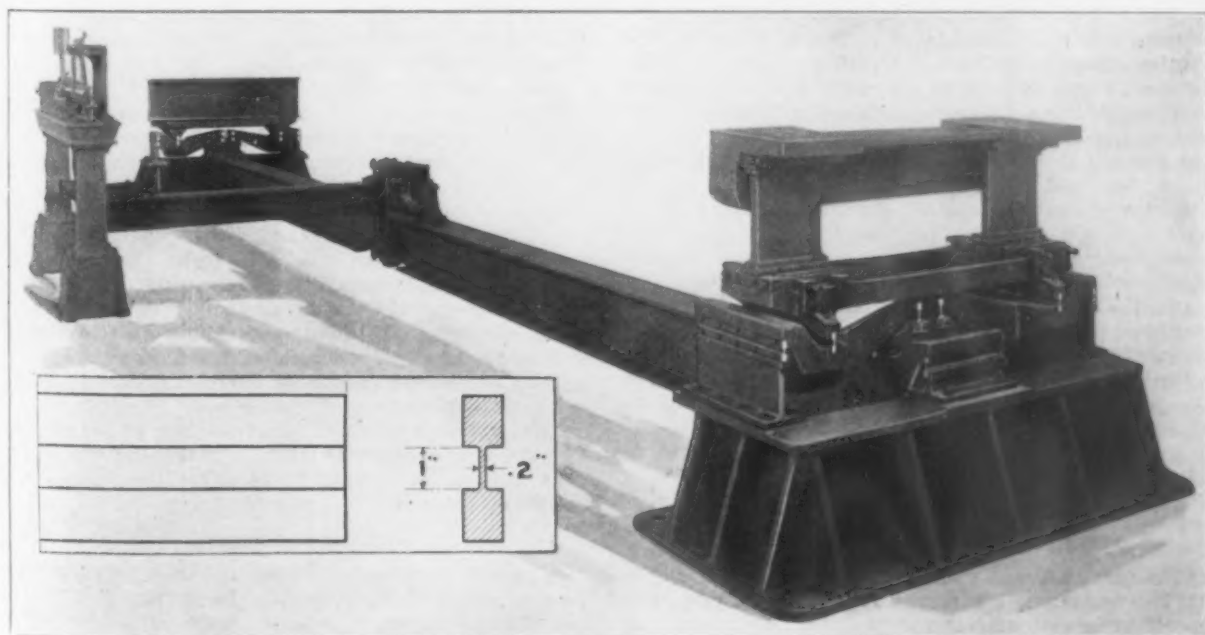
back to back of the angles. They are tied together by transverse diagonal bracing, which is relied upon to give a rigid bridge construction that will resist longitudinal and lateral strains.

The general arrangement of the scale is brought out in the accompanying illustration. It is of the two-section type. Four main levers transmit the weight to two longitudinal extension levers that in turn transmit the load to the weighing beam through a transverse extension lever. The main and longitudinal extension lever stands are directly supported on base plates 24 in. deep and reinforced by ribbing which rest on the concrete foundation. The four main levers are steel castings and each is arranged to support three plate fulcrums. The longitudinal extension levers are composed of 20-in. 140-lb. Bethlehem girder beams and the transverse extension lever is a 10-in. H-beam. All of these levers have heavy steel castings at the butt end to support the plate fulcrums, which are supported in machined seats and are kept in place by a tapered clamping block.

Steel castings designed with a single web section connected to a heavier lower flange are employed as the lever stands and are supported on base plates resting on the foundation of the pit. The connections between the tips of the main and the longitudinal extension levers are made by heavy steel castings with machined recesses for engagement with the heads of the plate fulcrums of the levers. The longitudinal extension levers are connected to the transverse lever by radial struts having hardened curved steel surfaces in the lower portion that engage with hardened steel bearing plates supported on a platen, which in turn is suspended by rods from the bearing block engaging with the load plate in the transverse extension lever. The transverse extension lever is connected to the butt of the weighing beam by two suspension rods supporting a platen, which in turn supports a radial strut connection directly attached to the end plate fulcrum.

The main bridge is fixed at one end and free to move at the other, the former being supported by a transverse I-beam resting directly on a set of special bearing castings. The movable end of the bridge is supported on cast steel struts having hardened steel inserts engaging with hardened steel plates at their top and bottom surfaces.

The weighing beam is of open-hearth steel, notched and supported by plate fulcrums. It is provided with an indicator that moves over a graduated scale, and a locking device consisting of an eccentric engaging with a flat spring is provided to lock the beam when the scale is not in operation. An oil dashpot is provided at the tip end of the beam to steady its movement.



Seven Levers Suffice in This Two-Section Track Scale to Transmit the Load from the Rails to the Weighing Beam, and a Plate Type of Fulcrum, the Construction of Which Is Shown in the Insert, Is Employed in Place of the Customary Knife Edges

The Maintenance of Factory Equipment

Taylor Society Discusses Machinery
Upkeep and Mutual Benefit Societies
at its Winter Meeting in Boston

MAINTENANCE of factory equipment, the working of factory mutual benefit societies and the relation of the manager, workman and social scientist were three subjects which held the attention of about 150 persons through the three sessions of the winter meeting of the Taylor Society in Boston, March 2 and 3. Discussion on each subject was limited not by the unwillingness of those present to state their views, but by the amount of time available.

The Maintenance of Equipment

THE sessions were opened with the presentation of a paper by H. K. Hathaway, vice-president Tabor Mfg. Company, Philadelphia, entitled "Maintenance of Equipment under the Taylor System of Management." The author declared that the systematic maintenance of machinery and equipment was a fundamental part of good management. It was so regarded by J. W. Taylor, who early in his work developed a system which provided for the regular inspection and repair of equipment. This feature of Mr. Taylor's work has not received the attention that it deserves, and has in many cases been largely neglected. His presentation of the subject was substantially as follows:

Maintenance is a function that falls under the jurisdiction of the works engineer. The accompanying chart shows the division of the work of the works engineer, and also of the maintenance department.

Works Engineer has juris- diction over	{	Provision of light, heat, power, ventilation.	{	Grounds and buildings, and all piping and wiring forming part of the buildings.
		Operation of machine and carpenter shops.		Machinery in all departments, including line shafts, piping and wiring pertaining to machines.
		Operation of maintenance department.		Small tool equipment, including machine accessories.
		Prosecution of development work.		Fixtures, furniture and other appliances not covered above.
		Fire protection.		
		Sanitation.		

The object of the maintenance department is to maintain the established standards of equipment, without which the standards of performance of productive operations cannot be reached. The function of the maintenance department is preventive rather than corrective. For example, in the past the maintenance department, more frequently called the "repair gang," paid no attention to the equipment until long after it had reached the point where it failed to operate efficiently, or had actually broken down. It took no initiative whatever in making repairs or keeping equipment in order, but acted only on the direction of the superintendent or some one else in authority. Under scientific management the maintenance department assumes the initiative and takes the responsibility for keeping equipment in order. This centralization of authority, instead of its being scattered among a number of foremen and department heads, prevents in a large degree loss of output and interruptions to manufacture. This is so because the maintenance is entrusted to men who devote their entire time and energy to it, and who make inspections and repairs in an orderly and systematic manner.

Functions of the Maintenance Department

The functions of a maintenance department include: (1) The making of emergency repairs; (2) Systematic inspection of all machines and other equipment, at regular intervals, for the purpose of detecting any wear or incorrect adjustment which might ultimately result in a breakdown or cause a loss of efficiency in operation; (3) Making the adjustments and repairs shown by the inspection to be necessary; (4) Maintaining all records,

drawings, etc., that are of service in making repairs or in planning work, keeping inventories, etc.; (5) Developing improvements or changes in machines, fixtures and tools that may be necessary to the manufacture of a new line of product, or necessary for increasing the quantity and improving the quality of the present product, and reducing spoilage, and also with the object of decreasing the liability of breakdown and the necessity of frequent repair and adjustment; (6) The operation of tool rooms for manufacturing operations, and the maintenance of an adequate supply of small tools in good condition.

Mr. Hathaway discussed the foregoing functions in considerable detail. He stated that the nature of emergency repairs could seldom be forecast, and that the execution of them must be a matter for the judgment of the head of the maintenance department, consideration being given to the urgency and nature of the work, and to the possibility of preventing a repetition of the accident.

Periodic Inspections

Periodic inspection of all equipment is one of the most important functions of a maintenance department. The work of the inspectors should be laid out daily, and detailed and specific instructions regarding the machines to be inspected should be given to them each day. These instructions should cover the nature of the inspection to be made, and the character of defects to be looked for. The primary function of the inspectors is that of inspection only, and their reports should furnish the basis of instructions to the repair men for the remedying of the defects found. The inspectors, however, should be allowed to make certain minor repairs at the time of inspection, such as the replacement of worn-out set screws, etc., as well as the making of certain readjustments. Only such adjustments and replacements as do not require dismantling of the machine should be made by the inspectors.

The different parts of machinery will require inspection at intervals of varying length. Parts subject to rapid wear should be inspected more frequently than those whose service is not so severe. This feature may be handled by means of printed forms, which should show the different sections of the machine to be inspected at one time, the symbol of the instruction card for these sectional inspections, the date of the last inspection and name of the inspector, and designations, showing the detailed subdivision on the instruction card of the item calling for inspection or repair. There should be a detailed instruction card prepared for each of the parts of the machine to be inspected at one time. This should state explicitly what the inspection should cover, how it is to be made, the tools to be used, and the adjustments, repairs and replacements to be made at the time of inspection. The intervals at which the different inspections should be made must first be fixed by the judgment of the head of the maintenance department, and later modified according to the experience obtained in the course of the work. The intervals should be fixed short enough to insure the detection or correction of wear or misadjustment before it has become so serious as to affect the quantity or quality of the work.

Maintenance Records

A tickler file should be operated in connection with the maintenance department. The various instruction cards should be placed in it, to come out on the dates of the next inspection covered by the several cards, together with a maintenance inspection order. This, when properly filled out, becomes the inspector's report. The report, when returned, should be checked to ascertain that all of the work called for by the instruction

ard has been performed, and orders should then be issued for making the repairs needed. These are preferably reported by the inspector on a separate form, and should state explicitly the nature of repair to be made, so that a second inspection for the purpose of preparing instructions for the repair man will be unnecessary. After the entries on the inspector's report have been copied on a machine record sheet the report is filed under the machine symbol. At the same time the date of the next inspection is fixed and the inspection order made out and placed under the proper date in the tickler file.

Among the records which should be kept by the maintenance department are perpetual inventories of machines and equipment, drawings of machines, tools and other equipment, lists of parts of machines, etc., records of inspections, adjustments and repairs, and of their cost, plant layouts, including floor plans, showing machine locations, and such other records as may be needed to properly carry on the work of the maintenance department and to furnish information to other departments.

Development of Improvements

Regarding the development of improvements and of changes in machinery and other equipment, Mr. Hathaway said that new processes of manufacture or changes in old ones should first be worked out by the planning department. After arriving at a decision as to the new tools, fixtures, etc., needed, or as to changes in existing tools, it would call on the maintenance department to make the necessary drawings and get out the work. The same process is followed in regard to changes for the purpose of improving quantity and quality of production, or for decreasing spoiled work. Another important phase of this development work is the making of changes which will increase the durability of the equipment, and reduce the frequency of repairs and adjustments. These changes should originate in the maintenance department, which will be guided largely in this matter by the inspectors' reports, and the records of inspection and repair. These will indicate those parts that receive the most frequent attention of the repair men and therefore require a change in design.

The Expense of Neglected Maintenance

The discussion of Mr. Hathaway's paper brought out many practical suggestions regarding maintenance of equipment, and showed that neglect of this feature of shop operation might easily involve a heavy increase in the expense of production. Lieut. F. G. Coburn, naval constructor at the Boston Navy Yard, cited as an instance of this latter item an experience with the new chain-making plant at that yard.* A chain maker, supposedly highly skilled, turned out a product which for weeks had a consistently bad record, the links failing on test, having imperfect shapes, poor welds, and other defects. The foreman had recommended his discharge. Before carrying out the foreman's recommendations, Lieut. Coburn caused an investigation to be made, which showed that the oil used in the heating furnaces had water in it; that the dies in the steam hammers had become slightly misplaced and that the man had been furnished with three green helpers. On remedying these conditions the product of the chain maker immediately came within the requirements and there was no further complaint.

Lieut. Coburn called attention to the value of a maintenance system for auxiliary equipment, such as cranes. A delay in crane service affects the whole shop, and a crane breakdown may shut down a large part of the equipment. To obviate these delays, and shutdowns, he had instituted a series of weekly, quarterly and annual inspections of cranes along the lines suggested by Mr. Hathaway, with a resulting almost total elimination of crane failures.

Belting Records

The records which would be kept by a maintenance department, continued Lieut. Coburn, would substitute facts for opinions in many cases involving the expenditure of money. For example, at the Philadelphia

navy yard, a maintenance system was in operation, and such records were available. At the Boston Navy Yard the question arose as to whether or not it would be feasible and profitable to substitute woven belting for the leather belting in use on certain machinery. A long report was submitted by an official of the Boston yard, showing why, in his judgment, the woven belt would not prove satisfactory. As woven belts had been used at the Philadelphia yard, the report was sent there for confirmation. The surprising information came back that the records of the maintenance department showed that for the purposes mentioned the woven belting was not only cheaper, but gave superior service, as compared to leather belting. Continuing on the subject of belting, the speaker stated that at Philadelphia the regular inspection and repair of belts according to the methods formulated by Mr. Taylor had practically done away with belt failures, and had permitted the number of men who gave their whole time to belt maintenance to be reduced from four to two.

Relation Between Maintenance and Tasks

Lieut. Coburn then spoke briefly on the relation between maintenance and the performance of tasks as laid down by scientific management, and also the relation between maintenance and adherence to shop schedules. The tasks as set were based on certain standard conditions, and it would be difficult or impossible to fulfill the task if there should be any great departure from these conditions. Unless there is periodic inspection and repair of equipment, it will in time deteriorate from the original standard and men will fail to complete their tasks in the allotted time, and thus their earnings will suffer. Similarly, schedules are based on the performance of tasks in the allotted time, and if these times are exceeded the schedules are thrown away and no reliance can be placed on them. Mr. Hathaway corroborated these statements, and pointed out that while a man who was accustomed to a machine that had become worn or out of adjustment, often could complete his task with it, a new man on the machine would utterly fail.

W. O. Lichtner, of the staff of Sanford E. Thompson, Newton Highlands, Mass., called attention to the fact that often two inspections might be necessary to keep the equipment in condition, first the routine inspection, which would discover defects, and second, a detailed inspection of these defects to learn the best procedure to follow in correcting them. Robert T. Kent, consulting engineer, New York, advised the preparation of inspector's report blanks with specific questions which the inspector must answer, writing down either "yes" or "no," or entering a dimension which would show whether or not the part needed repair. He had often found that unless an inspector was required to fill in every space on a blank, items that should be examined were frequently overlooked. He also called attention to the fact that delays due to worn equipment were more serious than was commonly thought to be the case, and cited a case where production time studies revealed that the time lost in delays due to defective machinery amounted to over 15 per cent of the total time.

Maintenance and inspection of small tools, fixtures, etc., was just as important as the maintenance of the larger and heavier machinery, according to W. A. Schulz, of the Tabor Mfg. Company, Philadelphia. Imperfections in these affected production just as much as imperfections in machine tools. For this reason the tool room becomes an important adjunct of the shop under scientific management, and should be subject to the regulations of the maintenance department.

Sanford E. Thompson pointed out that while the discussion apparently showed that the maintenance of equipment was poor in shops operating under scientific management, the facts were that scientific management caused all defects which hampered production to stand out more prominently than they did in shops not so managed. If a man lost his bonus due to poor equipment he would call the attention of his superiors to the fact so forcibly that the matter would receive attention, whereas if he were working for day wages he would permit his production to drop as the machine

*Described in THE IRON AGE, Dec. 14, 1916.

deteriorated, without making any complaint short of an actual breakdown. As a matter of fact, said Mr. Thompson, the machinery in the scientifically managed factories was as a rule found to be in much better shape than in those not so managed.

The Mutual Aid Society in the Factory

THAT the welfare of the workman is a subject to which manufacturers are giving close attention was made evident by the discussion which followed the paper by Herman J. Hutkin and Nathaniel Johnson, describing the Mutual Benefit Society of the Tabor Mfg. Company, Philadelphia.

The Tabor society, according to the authors, is in reality a co-operative one, the company paying into the treasury of the society an amount equal to that paid in by the members. All employees of the company, from the president down, are eligible for membership, providing they have been in the company's employ for thirty days. The dues are fifteen cents per week, with an entrance fee of fifty cents. There are three classes of members: salaried, hourly rate married workers and hourly rate unmarried workers. The society pays a death benefit of \$75, and sick benefits for a period of 10 weeks, as follows: Salaried members, \$5 per week; hourly rate married workers, \$10 per week; hourly rate unmarried workers, \$7 per week. In no case may the sick benefit exceed the weekly earnings of the beneficiary under hourly rate. Whenever there is in the treasury a surplus over \$200 it may be employed in case of necessity for special benefits, such as payments for operations, hospital fees, etc. If no surplus is available, and the necessity of special relief arises, a meeting of the society is called and means are provided, usually by voluntary contributions, for affording relief. These special benefits have proved of great service in many cases. Mr. Hutkin said, "Two members showed symptoms of tuberculosis, and were sent to a sanitarium for four months, during which time their board was paid by the society and their families given from \$5 to \$7 per week, in addition. Another member had to have the services of a specialist, but was unable to pay the necessary fees. The society paid the specialist, and when he recommended that the member be sent to the hospital the society undertook to pay the hospital bill, and the man's family received regular benefits until he returned to work."

An important feature of the society's work is the provision of free medical service. A physician has been engaged, who is also a surgeon. He is paid ten cents per week per member by the society, and is required to advise and treat the members at any time and as often as may be necessary. He, however, does not furnish medicines. The physician receives his fee in monthly installments, irrespective of the amount of work done. He visits the factory daily, and the company pays the men for the time they lose in consultation with him. The society urges on the men the advantage of regular consultations with the physician in regard to conservation of their health. The physician is required to visit the home of all members who report illness. The free medical service does not extend to the families of the members, however.

In addition to the medical services and sick and death benefits, the society has other functions. It operates a savings fund for the members, and receives deposits of any amount. When the amount of a member's savings reach \$25 the account is transferred to a regular savings bank, and placed in the member's own name. The treasurer of the society will make deposits and withdrawals from these accounts for the members, thus avoiding loss of time by them. The society will also loan any amount up to one week's pay to the members, the loan being repaid in weekly installments deducted from their pay envelopes.

A visiting committee of three members is maintained to visit sick members. This committee is the medium through which the benefits are paid. There is also a sanitation committee which inspects the sanitary arrangements of the shop and calls the attention of the company to any neglect of these features or to desirable

improvements in them. An entertainment committee looks after the social activities of the employees.

The administration of the society is in the hands of a president, a secretary, a treasurer and seven trustees. The president and six of the trustees must be elected from the employees. The seventh trustee is required to be an officer of the company. For convenience, the paymaster of the company is made treasurer of the society. He is given power of attorney authorizing him to deduct the weekly dues from the pay envelopes of the members.

Aside from the material benefits resulting from the activities of the society, Mr. Hutkin stated that a spirit of co-operation among the employees and of loyalty to the company had been developed which had proved of substantial advantage to all.

Mutual Aid at Dennison Mfg. Company

Arthur B. Rich, of the Dennison Mfg. Company, felt that the trustee representing the company in mutual aid societies should be elected by the members of the society rather than by the company. He criticized the feature of the Tabor society whereby the company contributed an amount equal to that paid in by the members. At the Dennison Mfg. Company the sentiment of the workers was that any contribution from the company partook of the nature of charity, and so was resented. Mr. Hutkin met these points by the statement that a company trustee elected by the members did not take his duties in the society very seriously, whereas his appointment to those duties by the company put them in a different light. The company contribution the men felt to be in reality their own contribution, as otherwise they would receive the money in the form of wages. As a matter of fact, the company contribution is charged to the wage account.

Continuing, Mr. Rich stated that at the Dennison Mfg. Company it had been found unwise to include women in the same benefit society as men. They were the recipients of more frequent sick benefits, were more indifferent to the society and far more lax in keeping up their dues. A separate organization was maintained for the women, and its success was due largely to the entertainment features organized by the society. Dues to the societies were collected by collectors, the company insisting that the pay envelopes contain the full earnings of the employee when they are delivered.

Mr. Rich questioned the justice of the unequal benefits of the Tabor society, while the dues were the same for all classes. Reply was made to this that the benefits were apportioned more on the necessities of the case than on strict justice. A married man certainly had greater responsibilities than a single one, and had need of more assistance when his earning power ceased. A salaried man had less need of assistance than the other two classes, because his pay continued during his disability.

Mr. Rich gave the practice of the benefit societies at the Dennison Mfg. Company in regard to special benefits, as the setting aside of a reserve for such cases. This reserve should amount to a certain proportion of the dues, or of a certain definite sum per member. In his company 5 per cent of the dues were thus set aside.

The Risk in Benefit Societies

Inquiry was made by Henry P. Shelton, of the Amos Tuck School of Business Administration, Dartmouth College, as to whether the liability of the benefit societies had been worked out on an actuarial basis. He cited the case of a number of fraternal life insurance societies which had failed because dues and assessments were too low to meet the drain as the older members commenced to die off. Reply was made that nothing had been done in this respect, and that the cases were not comparable. The older a life insurance society becomes the higher the proportion of men it will contain who would soon become a drain on its resources, which would have to be met by the addition of a larger number of new and younger members. In the mutual

benefit society, the average age of the members remained practically constant, due to the constant changing of personnel.

The Credit Union

The savings and loan features of the Tabor society were commented on by Mr. Stanton, general manager of the Massachusetts Credit Union, Boston, who then described the workings of that organization. This is an institution which has successfully combated the loan shark evil among working people. Briefly, the credit union establishes a branch in each factory which applies for a charter, and which can satisfy the requirements of the state banking department. Those employees wishing to take advantage of it are required to buy at least one share of stock in the union costing \$5. This may be paid in installments of 25 cents per week. The shares draw dividends on Oct. 31 of each year. The members of the union may deposit money with it, which will draw interest as in a savings bank, and they may also borrow from it under certain conditions. The deposits may be made in any amount, however small.

Loans are approved by a loan committee of members, and must be for a thrifty purpose, and must be safe. The committee exercises its judgment as to the security required. The members are encouraged to borrow if they can, thereby reducing their net expenses. For example, they are encouraged to borrow in summer in order to purchase coal for winter use at the much lower prices prevailing in summer. The rate of interest on loans may not exceed 12 per cent per annum, and is usually less. It averages about 8 per cent, and has been as low as 4 per cent. Repayments on loans are made in installments, starting within a week or two from the time of the loan.

The control of each branch of the union is vested in a board of directors who elect the officers from their own membership. There is also the loan committee and a supervising committee which acts for the members when they are not in session. This committee has absolute power of suspension of any officer or director pending his trial on charges by the members for any dereliction of duty.

Eugene L. Folsom, Waltham Watch Company, Waltham, Mass., described how the branch of the credit union at that plant had grown out of vacation clubs, Christmas clubs, etc., organized by the employees themselves. The credit union was deemed to be a much safer and more efficient means of saving, and was therefore established by the company.

W. B. Fuller, Curtis Publishing Company, Philadelphia, described the activities of that company for the benefit of the employees. These included a savings association, in which the members bought shares, made deposits and contracted loans in much the same manner as the credit union above described; a mutual benefit association; a vacation fund, and a Christmas fund. In addition a country club for employees was maintained and a welfare and service department. All employees absent more than three days are visited by a representative of the welfare department.

The directors of the Wagner Electric Mfg. Company, St. Louis, have ordered an 80 per cent special dividend in addition to the regular quarterly dividend of 2 per cent, payable April 2. An increase of the company's capital from \$2,000,000 to \$5,000,000 has been authorized and made effective. The annual report showed that the company's net profits for 1916 were 87.4 per cent. The stockholders have their option of taking the 80 per cent dividend in either the new stock at par or in cash. The company's stock has been quoted lately at 325. W. A. Layman, president, and all other officers were re-elected at the recent stockholders' and directors' meetings.

The Penn Iron Works, Lancaster, Pa., has commenced the operation of two of its four mills. The other two mills will be operated at an early date, producing a weekly total of about 500 tons of iron and steel bars.

CATALYTIC ACTION OF GASES*

What Takes Place in the Firebed of a Stoker Not Surface Combustion

Some have attempted to explain the action of the gases within the firebed of the under-feed furnace by calling it a surface combustion effect, but I am afraid that I cannot agree with them. The so-called surface combustion is produced by bringing a mixture of combustible gas with but slight excess of the required amount of air into intimate or penetrative contact with some solid body of a more or less porous, open or granular structure, heated to a high temperature, which form of solid body is known as a catalyzer. The tendency of the resulting chemical or catalytic action taking place at the surface of these catalytic agents is to increase the velocity of the chemical combination while it, in itself, is left unchanged at the end of the reaction.

Catalytic action may take place on the surface of a lump of glowing coal during the time its occluded or liberated gases are given off by the action of the heat, but it does not follow that lumps of coal brought in contact with other surrounding gas act to accelerate very materially, in a similar manner, the reaction necessary to effect the final product of combustion.

There are two ways in which the complete combustion of gases takes place. The first is a homogeneous combustion in which the velocity of the chemical change is dependent upon the order of the reaction, and combustion or reactions occur equally throughout the entire mass; the second is a heterogeneous combustion which occurs in layers immediately in contact with a hot surface, and for this reason the term surface combustion has been given to this form of combustion.

To obtain an effective surface combustion, a refractory material is best adapted, and the activity of the surface presented is governed by the texture of the surface, the condition of the surface as related to the kind of gas consumed and its retarding effect upon the films of gas formed. Surface combustion is effected by forcing an explosive mixture of air and gas through refractory porous diaphragms, and in such cases the combustion seems to be concentrated within the interstices of the fireclay body, and it is always the most intense on the outer surface, where no flame is visible. Surface combustion is also obtained by a somewhat less effective means where the air and gas are forced through a porous bed of incandescent granular refractory material under pressure and under favorable conditions the flame disappears and a high temperature results at the surface of the catalyzer.

With a proper understanding of what the term surface combustion is intended to convey, there can be but little reason for making a claim that the action in the fuel bed of an under-feed furnace is one of surface combustion. In the under-feed furnace we find a great number of reverberatory actions taking place throughout the fuel bed which rapidly raise the temperature of the air and gases. By thus increasing their temperature we hasten the rate of combustion, and this tends to produce a higher temperature, the same as is produced in ordinary blow-pipe practice, where the flame is projected against a block having the capacity to maintain a high temperature, but it is not reasonable to call such an action one of surface combustion.

The Gisholt Machine Company, Madison, Wis., established its rank as the largest taxpaying corporation in the capital of Wisconsin when it paid its assessments, Feb. 27. Its taxes on net income under the Wisconsin income tax law amounted to \$67,642.40, and its taxes on real estate to \$14,178.21, a total of \$81,820.61.

*In the course of a discussion of a paper on "Power Plant Efficiency" presented by Victor J. Azbe before the annual meeting of the American Society of Mechanical Engineers, New York City, in December, 1916, Albert A. Cary, consulting mechanical engineer, New York City, contributed the above notes on what he urges is a misconception of the catalytic action of gases in combustion, for example, in coal-burning furnaces under boilers.

An Investigation of Deoxidizers for Steel*

Relative Merits of Various Commercial Agents Used in Steel Making—Silicon and Aluminum Rank Highest—Titanium Discussed

BY H. M. BOYLSTON

FEW problems in the steel industry have been the subject of more investigation than that of making sound ingots or castings, and the means of preventing blowholes have been widely studied in this connection. Whether made by the crucible, the Bessemer or the open-hearth processes, steel when cast is subject to blowholes, and various devices have been employed, and all kinds of "physic" added, to prevent the occurrence of these cavities, which exist sometimes near the surface and sometimes near the center of the cast metal, rendering it in most cases of little value for castings and for large ingots except where the carbon content is low. The cause of these cavities has generally been associated in most minds with the presence of oxides of iron, and the materials used for their prevention have therefore come to be known as deoxidizers.

It seemed desirable to compare directly the effect of the more ordinary so-called deoxidizers in

defect can generally be prevented by physical means. It should, of course, be borne in mind that a reagent may render an ingot or casting perfectly sound as regards blowholes while adding material in the way of by-products of deoxidation which would affect the physical properties of the metal. Hence the physical properties will be taken into account in this research.

A Tropenas 2-ton converter was available for this work, and it was not easy to make arrangements for the use of any other type of furnace. The choice was therefore controlled by practical considerations, yet as the Bessemer process is the one which gives the most highly oxidized product, perhaps, of any of the ordinary processes, it is possible, by exaggerating the oxidizing conditions by the use of this method, as well as by overblowing the metal, to create conditions in which deoxidizing conditions can be studied more effectively. It should not, therefore, be inferred that the re-

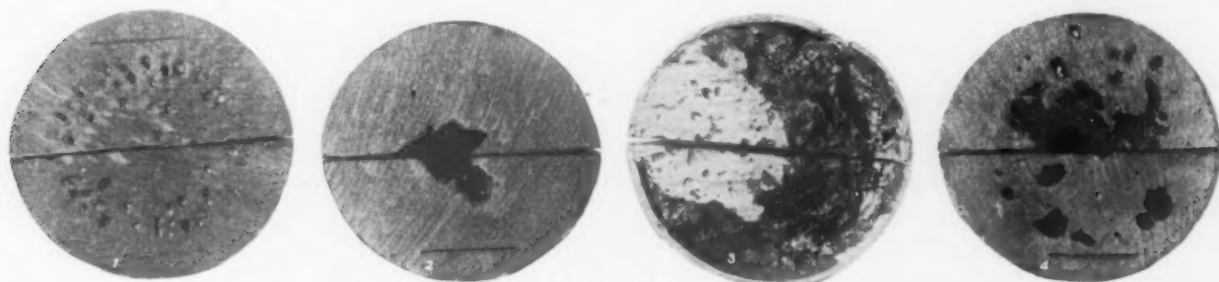


Fig. 1 Is Raw Converter Metal. Fig. 2 Is Raw Converter Metal with 0.05 Per Cent Aluminum Added. Fig. 3 Is Raw Converter Metal with About 18 Lb. of Washed Metal Containing 3.46 Per Cent Carbon Added. Fig. 4 Is Raw Converter Metal with 0.05 Per Cent Aluminum and About 18 Lb. Washed Metal Containing 3.46 Per Cent Carbon Added. All Are Transverse Sections at Cropping Point and About One-quarter Full Size

order to furnish a scientific basis, first, for detailed experiment in any particular case, and second, to obtain a rough approximation of the relative merits of different agents. The fact that all the substances used for this purpose have a great affinity for oxygen is further evidence that most metallurgists have recognized the influence of oxygen on blowhole formation.

The author realizes that the terms deoxidizer and deoxidation may be open to criticism. The terms solidifier and degasifier have suggested themselves, but although gases other than oxygen probably play considerable part in the formation of blowholes, he believes that the term deoxidizer is so well established in its special meaning that it is the best word to use in connection with this research.

Object of the Research

The chief object of this research is to ascertain the effect of the various commercial deoxidizers in rendering steel sound, especially as regards blowholes, and in removing oxides of iron which render steel red-short and unforgeable, as Bessemer found in his early experiments. The prevention of piping is not considered here except incidentally, since this

sults obtained in these experiments are directly applicable in detail to all methods of steel-making, especially in regard to the proportion of deoxidizer added, but the author hopes that the results will point the way to similar work with other steel processes, notably the basic open hearth, which produces the largest tonnage of any, at least in the United States.

It was decided that the effect of the various deoxidizers on raw converter metal should first be determined, in order to select the proportion of each to be used for comparison with each other in the making of actual steel. Much thought was given to the selection of the proportions to be added. Where obtainable the advice of the manufacturer of the deoxidizer was followed fairly closely, and in all cases the advice of numerous well-known metallurgists and steel men was taken. It was finally decided to cast 72 ingots of raw metal (from the Tropenas converter), to which the various proportions of the different deoxidizers were to be added. Four proportions of each were used, and the ingots were made in triplicate, the object being merely to determine which of the four gave the soundest ingot as measured by density and the appearance of a section. Vertical sections would have been more valuable than transverse, but their cost made them impracticable.

*From a paper awarded a Carnegie Scholarship Memoir by the Iron and Steel Institute in 1916. The author is associated with Prof. Albert Sauveur as Sauveur & Boylston, Cambridge, Mass.

The second experiment included 15 ingots of commercial steel from one heat, to which were added the proportions of each deoxidizer which were found to give the best results in Experiment 1. The ingots in Experiment 2 were subjected to a more complete examination, tests being made for density, porosity, tenacity and ductility, in both cast and forged metal after annealing. All ingots were cast in a steel foundry under works conditions.

Details of Procedure

The first plans called for the use of steel (as opposed to raw converter metal) for Experiment 1, and the method was to add washed metal to bring up the carbon content.

Several preliminary experiments were therefore made to find out what deoxidizing or solidifying effect the washed metal itself might have, in order to decide the order in which the deoxidizer and the recarburizer should be added. Twelve ingots, weighing about 150 lb. each, were poured, two of these being (1) raw converter metal, and the other 10 having added to them (2) aluminum only, (3) washed metal only, (4) aluminum and washed metal, (5) washed metal and then aluminum. In most cases more than one ingot was made with a given addition.

In Figs. 1 to 4 inclusive are shown photographs, about one-fourth natural size, of ingots representing the first four of these classes in transverse section at the point of cropping.

The amount of carbon in these ingots ranged from 0.184 per cent and 0.17 per cent in ingots 1 and 2, and 0.33 per cent and 0.314 per cent in ingots 3 and 4.

It is interesting to note the comparative solidity of the raw converter metal cast without additions, but it must be remembered that this metal contained about 0.184 per cent carbon, and could therefore hardly have been as much overblown as was intended. This is verified by the casting notes, which state that the metal was very slightly overblown. The additions of aluminum, either alone or with washed metal added later (Figs. 2 and 4), produced a deep pipe but no blowholes, whereas when washed metal alone was added an extremely spongy ingot was produced.

These preliminary ingots suggested that it might be well to make an experiment with commercial steel, adding the deoxidizers before making the usual additions of carbon, manganese and silicon.

It was finally decided to perform Experiment 1 with raw metal instead of recarburized metal, so that a direct measure might be obtained of the deoxidizing and solidifying effect of the additions under test.

Proportion of Ferro-Carbon Titanium

In order to determine what should be the largest proportion of ferro-carbon titanium to be added, and whether the additions should be preheated, three preliminary ingots were poured, the first being plain converter metal to check the previous results, the second containing about 4 lb. of 15 per cent ferro-carbon titanium in very small pieces but not preheated, while to the third was added the same amount of 15 per cent ferro-carbon titanium which had been preheated to redness, using a smoky oil flame. The intention was to add 0.3 per cent metallic titanium. Ingot No. 1 checked the previous results with plain converter metal very closely. In Ingot No. 2 there was a considerable quantity of frozen material left in the hand ladle, and in both Ingots 2 and 3 most of the ferro-carbon titanium floated to

the top and apparently was not absorbed. It was decided to use 0.1 per cent titanium in the form of the 15 per cent alloy as the maximum, and that with this smaller amount it need not be preheated. It should here be added that most of the published results where titanium has been used in steel mention 0.1 per cent titanium or less as the addition. The amount recommended by the manufacturers for commercial use is 0.1 per cent.

The steel was cast in three heats, 24 ingots to a heat. The converter metal, after being somewhat overblown, was slagged off and poured into preheated clay-lined crucibles which served as hand ladles. The additions had been previously carefully weighed out to the nearest half ounce in paper bags. The molds were of sand, carefully baked and arranged as far as possible in one large flask for convenience. The dimensions were such as to accommodate an ingot 20 in. high by 6 in. in diameter. They were made by skilled molders according to the usual works practice at Watertown Arsenal, Watertown, Mass.

Steel was blown, slagged off and poured by the men employed for this purpose at the Arsenal, and a large force was used in order to handle the ladles

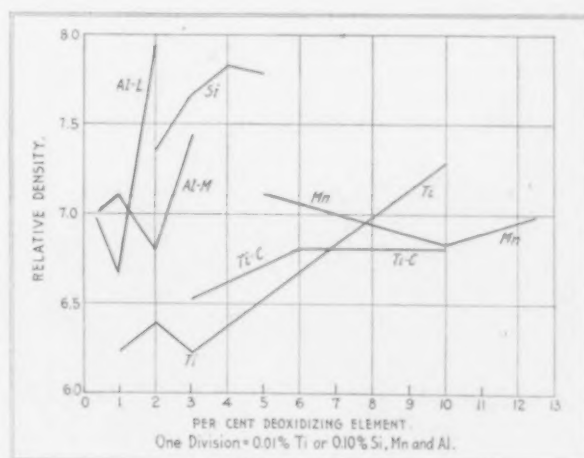


Fig. 5—Diagram Showing Relative Density of Ingots of Converter Metal with Various Deoxidizers Added. Al-L=Aluminum Added in Ladle. Al-M=Aluminum Added in Mold. Si=Ferrosilicon. Ti=Carbonyl-Free Ferrotitanium. Ti-C=Ferro-carbon Titanium. Mn=Ferro-manganese

rapidly. The steel was poured from the large ladle into the hand ladles by tilting, and the proper amount of metal was ascertained by filling the ladle to a certain mark made previously. The endeavor was to have the ingots all, as near as possible, of the same size. On account of the small size of ingot, it was found impracticable to weigh the metal each time for fear of sculling. The deoxidizers were all weighed and added to the metal by the author.

It was attempted to hold the metal in the crucible for two minutes after making the addition, but it was soon found that this was impracticable. Most of the castings were held from one-half to one minute after the additions were made. The temperatures were taken with a Holborn-Kurlbaum optical pyrometer by an experienced operator.

The ferro-carbon titanium used contained 5.92 per cent carbon, 2.10 per cent silicon and 14.32 per cent titanium. The carbon-free ferrotitanium contained 1.30 per cent silicon, 7.61 per cent aluminum and 24 per cent titanium. Ferromagnesium and ferrovanadium were considered when planning the experiment, but the former is so expensive as to be limited to very high-grade steels, and ferrovanadium is also expensive and is not now advocated as a deoxidizer by the principal manufacturers, who state that, although ferrovanadium has some deoxidizing

power, their instructions to users call for its addition under conditions where it cannot easily be oxidized, basing their claim to advantage on its effect on the physical properties, and making what is practically an alloy steel, although the proportions of vanadium used are generally very small. These two materials were therefore omitted. In the case of aluminum, additions were made in the mold in some cases as well as in the ladle.

(The original paper gives tables of the various proportions of deoxidizers used.)

Chemical Analyses

The expense of making complete chemical analyses of all the ingots in Experiment 1 was prohibitive, but in Table 1 are shown analyses for carbon in Ingots 10, 41 and 53, these being representative ingots from those series in which the additions contained no carbon. In this table also are given the chemical analyses of representative ingots from Heat C showing the loss of deoxidizing element in the respective cases. It is noteworthy that no titanium was found either in the case of ferro-carbon titanium or of carbonless ferrotitanium. The ingots analyzed were chosen from those containing the proportions of deoxidizer giving the densest ingot and hence selected for Experiment 2.

Table 1—Chemical Analyses of Selected Ingots from Experiment 1

Ingot No.	Approximate Percentage Deoxidizer Added	Heat No.	Carbon, per Cent	Manganese, per Cent	Silicon, per Cent	Titanium, per Cent	Aluminum, per Cent
10	0.01 Ti	A	0.030				
41	0.05 Al	B	0.043				
53	0.01 Ti	C	0.040				
32	0.10 Ti as Fe-C Ti	C	0.100			None	
56	0.10 Ti as Fe-Ti	C	0.091			None	
59	0.40 Si	C	0.081		0.424		
61	0.50 Mn	C	0.114	0.40	0.415		
67	0.20 Al	C	0.107	0.02	0.055		0.028

In both ingots where titanium was added it was all lost. In Ingot 61, where manganese was added, there was a loss of about 0.12 per cent manganese, or about one-fourth of the manganese added, while in Ingot 59 there was a very slight loss of silicon, and in Ingot 67 about four-fifths of the aluminum was lost. It is difficult to explain why Ingots 56, 59, and 67 contain from twice to three times as much carbon as the raw converter metal. The small amount of carbon (0.16 per cent) in the ferro-silicon is too small to account for the increase in carbon in this case. The manganese and silicon contents of Ingot 67 may be taken to represent those of raw metal in Heat C.

Relative Density of Ingots

The relative density of the ingots cast in Experiment 1, as determined by weighing in air and in water, was taken as the criterion for determining the proportion of each deoxidizer to be used in Experiment 2, where commercial steel was to be used.

(The author gives in detail the method of determining the density and tables of the results in each case.)

In the majority of cases these relative densities are as constant as could be expected with the variation in pouring temperature, which could not be entirely avoided.

Efficiency of the Deoxidizers

In Fig. 5 are plotted the average relative densities. It will be noted that for the proportions used aluminum added in the ladle gives the densest ingots in general, while the general efficacy of the other deoxidizers is in the following order:

- Silicon.
- Aluminum in the mold.
- Carbon-free ferrotitanium.
- Ferromanganese.
- Ferro-carbon titanium.

The curves cross each other somewhat, but the maximum of each curve is taken as the criterion. It will be noted that the smallest proportion of ferromanganese gives the best results, further additions apparently chilling the metal. The curve

for ferromanganese begins to rise again, however, for the highest proportion used, and this is a point that will bear further investigation. The scale of relative densities has purposely been exaggerated to bring out more clearly the difference in relative density.

Conclusions

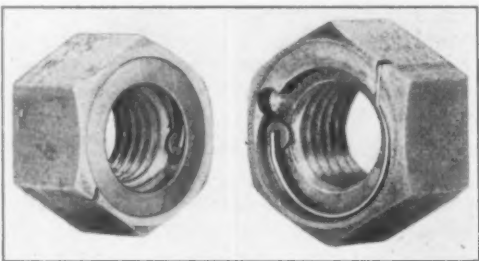
Photographs of the cross sections of the cropped ingots were taken at the point of cropping. In general they were very consistent with the relative density figures. In most cases aluminum and silicon produce a small pipe but few if any blowholes, whereas both titanium alloys and ferromanganese produce many blowholes, but little if any pipe.

The object of Experiment 1 was principally to determine the proportion of deoxidizer to be used in Experiment 2, and too much value must not be attached to the comparison of the various deoxidizers based on this experiment, for it must be remembered that the material used was raw converter metal and not commercial steel, and no physical tests (except density) were made.

Nevertheless, the conclusion is inevitable that apart from other additions, and considering the proportions of deoxidizer used, aluminum and silicon are notably better agents than the other for increasing the density of blown metal and almost equally effective when the proper proportions are used, the preference inclining slightly in favor of aluminum (in the ladle). Moreover, the slight porosity of the metal to which these two deoxidizers have been added is due to a slight pipe rather than to blowholes. Further experiments are in course of being undertaken.

Lock Nut Employing a Roller Device

A new type of lock nut has been brought out by the Roller Lock Nut Company, 61 Broadway, New York City. A steel roller held in place by a brass spring arm anchored at the outer part of the nut acts as the lock, wedging into the threadway. It is found to effect a



The Locking of This Nut on a Bolt Is Effected by the Roller Which Wedges into the Threadway and Is Forced into the Circular Recess when the Nut Is to Be Removed

lock against backward movement of the nut, but permits a forward movement, so that the effect of vibration is to cause the nut to seat itself more tightly as it creeps up along the bolt under the influence of the vibration.

The application of a strong wrench pressure is all that is required to remove the lock nut. This causes the roller to bite deeper into the threadway, and the nut turns slightly. This movement causes the roller to drop into the circular recess shown just above the roller in the view of the nut with the cover removed. This permits the nut to be spun off by hand, and it is explained that the thread of the bolt itself is not injured as any nicking which may occur is in the threadway.

Contracts for two cargo vessels, each 435 ft. long, have been given the Sun Shipbuilding Company, Chester, Pa., by the Cunard Line. The vessels are to be completed next year. The Sun Company recently laid the keel for its first vessel, a tank steamer for the Sun Oil Company.

PRODUCTION OF PIG IRON IN THE UNITED STATES IN 1916

(From Special Statistical Bulletin No. 1 of the American Iron and Steel Institute)

HALF-YEARLY PRODUCTION OF ALL KINDS OF PIG IRON, 1916.

States.	Blast furnaces.			Production—Gross tons. (Includes spiegeleisen, ferro-mang., ferro-silicon, ferro-phosphorus, etc.)			
	In blast June 30 1916.	Dec. 31, 1916.		First half of 1916.	Second half of 1916.	Total 1916.	
		In.	Out.				Total.
Massachusetts	1	1	1	2	4,700	1,019	5,719
Connecticut	0	1	2	3			
New York	20	18	9	27	1,214,037	1,138,498	2,352,535
New Jersey	1	1	4	5			
Pennsylvania	132	127	30	157	8,286,078	8,220,208	16,506,284
Maryland	4	4	1	5	243,895	257,557	501,452
Virginia	9	9	13	22	202,777	197,108	399,885
Georgia	0	0	4	4			
Texas	0	0	2	2			
Alabama	31	29	18	47	1,366,728	1,396,157	2,762,885
West Virginia	4	4	0	4			
Kentucky	4	4	2	6	268,859	285,731	554,590
Mississippi	0	0	1	1			
Tennessee	12	11	7	18	162,009	193,365	355,374
Ohio	67	65	12	77	4,250,790	4,352,105	8,602,895
Illinois	23	24	0	24	1,938,152	1,984,360	3,922,512
Indiana	10	10	0	10	1,073,768	1,147,940	2,221,708
Michigan	12	12	2	14			
Wisconsin	6	6	3	9	417,542	393,783	811,325
Minnesota	3	3	0	3			
Missouri	1	2	0	2			
Iowa	0	0	0	0			
Colorado	4	3	3	6	190,189	247,444	437,633
Oregon	0	0	1	1			
Washington	0	0	0	0			
California	0	0	0	0			
Total	344	333	115	448	19,019,522	19,815,275	39,434,797

HALF-YEARLY PRODUCTION OF COKE PIG IRON.

New York	20	18	5	23	1,214,037	1,138,498	2,352,535
New Jersey	1	1	4	5			
Pennsylvania	124	112	23	135	8,205,199	8,090,729	16,295,928
Maryland	4	4	0	4	243,895	257,557	501,452
Virginia	9	9	11	20			
Georgia	0	0	2	2	202,777	197,108	399,885
Texas	0	0	1	1			
Alabama	29	28	13	41	1,346,460	1,377,223	2,723,683
West Virginia	4	4	0	4			
Kentucky	4	4	1	5	268,859	285,731	554,590
Tennessee	11	10	7	17	161,128	191,944	353,072
Ohio	67	65	11	76	4,250,790	4,351,438	8,602,228
Illinois	23	24	0	24	1,938,152	1,984,360	3,922,512
Indiana	10	10	0	10	1,150,364	1,202,824	2,353,188
Michigan	3	3	0	3			
Wisconsin	5	4	2	6			
Minnesota	3	3	0	3			
Missouri	0	1	0	1			
Iowa	0	0	0	0			
Colorado	4	3	3	6	366,274	429,251	795,525
Washington	0	0	0	0			
California	0	0	0	0			
Total	321	303	85	388	19,347,935	19,496,663	38,844,598

ANTHRACITE AND MIXED ANTHRACITE AND COKE PIG IRON.

New York	0	0	3	3			
Pennsylvania	6	12	5	17	79,591	138,197	217,788
Total	6	12	8	20	79,591	138,197	217,788

HALF-YEARLY PRODUCTION OF CHARCOAL PIG IRON.

Massachusetts	1	1	1	2	4,700	1,019	5,719
Connecticut	0	1	2	3			
New York	0	0	1	1	1,286	1,282	2,568
Pennsylvania	2	3	2	5			
Maryland	0	0	1	1			
Virginia	0	0	2	2			
Alabama	2	1	3	4	20,268	18,934	39,202
Georgia	0	0	2	2			
Texas	0	0	1	1			
Kentucky	0	0	1	1	881	2,088	2,969
Tennessee	1	1	0	1			
Mississippi	0	0	1	1			
Ohio	0	0	1	1			
Michigan	9	9	2	11	132,637	127,986	260,623
Wisconsin	1	1	1	2			
Missouri	1	1	0	1			
Oregon	0	0	1	1	32,224	29,106	61,330
Washington	0	0	0	0			
California	0	0	0	0			
Total	17	18	22	40	191,996	180,415	372,411

TOTAL PRODUCTION OF PIG IRON ACCORDING TO FUEL USED.

Coke	321	303	85	388	19,347,935	19,496,663	38,844,598
Anthracite*	6	12	8	20	79,591	138,197	217,788
Charcoal	17	18	22	40	191,996	180,415	372,411
Total	344	333	115	448	19,619,522	19,815,275	39,434,797

* Includes mixed anthracite and coke pig iron

PIG IRON MADE FOR SALE OR FOR USE OF MAKERS IN 1916.

Grades	For sale	For maker's use.	Total Gross tons.
Basic	2,476,677	15,207,410	17,684,087
Bessemer and low-phosphorus	1,976,863	12,445,594	14,422,457
Foundry, including ferro-silicon	5,473,196	80,448	5,553,644
Malleable	921,486	0	921,486
Forge or mill	144,615	203,729	348,344
Ferro-manganese	63,166	158,366	221,532
Spiegeleisen	143,753	50,249	194,002
All other grades	53,561	35,684	89,245
Total	11,253,317	28,181,480	39,434,797

HALF-YEARLY PRODUCTION OF BASIC PIG IRON.

States	First half of 1916.	Second half of 1916.	Total for 1916.
New York, New Jersey	573,244	632,596	1,205,840
Pennsylvania—Allegheny County	2,309,777	2,167,298	4,477,075
Other counties	2,578,396	2,328,799	4,907,195
Virginia, Alabama, Kentucky	501,225	686,085	1,187,310
Ohio	1,199,267	1,257,609	2,456,876
Indiana, Illinois	1,416,246	1,451,455	2,867,701
Michigan, Wis., Minn., Missouri, Colorado	251,930	329,560	581,490
Total	8,830,085	8,854,002	17,684,087

HALF-YEARLY PRODUCTION OF BESSEMER AND LOW-PHOSPHORUS.

New York	223,456	229,564	453,020
Pennsylvania	2,566,539	2,966,468	5,533,007
Maryland	227,652	241,343	468,995
West Virginia, Kentucky, Tenn., Ala.	236,182	260,406	496,588
Ohio	2,377,073	2,556,158	4,933,231
Illinois, Wisconsin, Colorado	1,208,275	1,329,341	2,537,616
Total	6,839,177	7,583,280	14,422,457

HALF-YEARLY PRODUCTION OF FOUNDRY PIG IRON

Massachusetts, Connecticut	4,700	1,019	5,719
New York, New Jersey	331,651	193,951	525,602
Pennsylvania	559,767	427,447	987,214
Maryland, Virginia, West Virginia	192,454	196,764	389,218
Kentucky	43,151	40,929	84,080
Tennessee	132,264	172,983	305,247
Alabama	824,867	668,506	1,493,373
Ohio	465,106	322,091	787,197
Indiana, Illinois	91,742	60,296	152,038
Michigan	199,600	180,397	379,997
Wisconsin	165,155	146,292	311,447
Minnesota, Missouri, Iowa, Cal., Wash.	75,953	56,559	132,512
Total	3,086,410	2,467,234	5,553,644

HALF-YEARLY PRODUCTION OF MALLEABLE PIG IRON.

New York	74,298	76,011	150,309
Pennsylvania	58,415	52,989	111,404
Kentucky, Ohio	139,682	146,498	286,180
Indiana, Illinois, Michigan, Wisconsin	188,444	185,149	373,593
Total	460,839	460,647	921,486

* HALF-YEARLY PRODUCTION OF FORGE PIG IRON.

New York, New Jersey	6,780	3,112	9,892
Pennsylvania	54,507	91,081	145,588
Virginia	16,103	4,364	20,467
Tennessee, Kentucky	1,366	1,588	2,954
Alabama	19,570	15,380	34,950
Ohio	70,680	72,241	142,921
Total	169,306	179,038	348,344

* Credit. Due to change in grade.

HALF-YEARLY PRODUCTION OF SPIEGELEISEN AND FERRO-MANGANESE.

N.Y., Pa., Md., Ala., Ill., Cal., Wash., Col.	189,046	226,488	415,534
Total	189,046	226,488	415,534

HALF-YEARLY PRODUCTION OF OTHER GRADES.

New York, New Jersey	2,108	3,264	5,372
Pennsylvania	8,586	11,639	20,225
Virginia, West Va., Tennessee, Alabama	27,984	23,353	51,337
Ohio	5,006	4,261	9,267
Indiana, Ill., Mich., Minn., Wis., Mo., Cal., Wash., Cal.	975	2,069	3,044
Total	44,659	44,586	89,245

PRODUCTION OF PIG IRON BY GRADES, 1900-1916.

Years	Basic	Bessemer	Foundry	Malleable	Forge	All other	Total Gross tons.
1900	1,072,376	7,979,327	3,376,445	173,413	793,092	394,589	13,789,242
1901	1,448,850	9,596,793	3,548,718	256,532	639,454	388,007	15,878,354
1902	2,038,590	10,393,168	3,851,276	311,458	833,093	393,722	17,821,307
1903	2,040,726	9,989,908	4,409,023	473,781	783,016	312,798	18,009,252
1904	2,483,104	9,098,659	3,827,229	263,529	530,836	273,676	16,467,033
1905	4,105,179	12,407,116	4,758,038	635,236	727,817	358,994	22,992,380
1906	5,018,674	13,840,518	4,773,011	699,701	597,420	377,867	25,307,191
1907	5,375,219	13,231,620	5,151,209	920,290	683,167	419,856	25,781,361
1908	4,010,144	7,216,976	3,637,622	414,957	457,164	199,155	15,936,018
1909	8,250,223	10,557,370	5,322,415	658,048	725,624	281,789	25,795,471
1910	9,084,608	11,245,642	5,260,447	843,123	564,157	305,590	27,393,567
1911	8,520,620	9,409,303	4,468,940	612,533	408,841	229,910	23,649,547
1912	11,417,886	11,664,015	5,073,873	825,643	469,183	276,337	29,726,937
1913	12,536,693	11,590,113	5,220,343	993,736	324,407	300,860	30,966,152
1914	9,670,687	7,859,127	4,533,254	671,771	361,651	235,754	23,332,244
1915	13,093,214	10,523,306	4,864,348	829,921	316,214	289,210	29,916,215
1916	17,684,087	14,422,457	5,553,644	921,486	348,344	504,779	39,434,797

Preparing American Industries for War

Many Problems Must Be Solved Before
Our Factories and Workmen Will Be
in Position to Aid the Army and Navy

— BY ROBERT THURSTON KENT* —

AT the time this article is written, the United States is closer to war than it has been at any time since 1898. In certain respects it is far less prepared for war than it was then. In other respects it is better prepared. In 1898 we were confronted by a relatively weak enemy and our lack of preparation was not a matter of such vital importance as it is to-day when our possible enemy possesses one of the most powerful military machines the world has ever seen. It is true that we, to-day, know something about mobilizing an army, due to the more or less unfortunate experience on the Mexican border. It is also true that American manufacturers have acquired a knowledge of the manufacture of munitions of war which they did not possess two or three years ago. These will be of distinct service to the country in the event of hostilities. On the other hand, modern warfare calls for the co-ordination of all the resources and industries of the countries involved. This co-ordination introduces a series of problems greater than any that have confronted this country in its entire history.

The Problem

In the event of war with a first-class power, one of the first moves would be to raise and equip an army commensurate with the resources of the nation and the strength of the enemy. Another highly important problem would be the immediate expansion of the navy and the creation of new units for it which are now lacking, such as battle cruisers, patrol fleets, mine sweepers, etc., and to organize and train the crews to operate them. The raising of the army and the organization of the navy are military problems pure and simple, which can safely be left to the military and naval authorities.

The equipment of both army and navy is a larger and far more difficult problem and is of a non-military character, except that its solution should be worked out in conjunction with the War and Navy departments to insure that the equipment shall be provided in the order and at the time it is desired by the army and navy. The problem is, in its ultimate analysis, an engineering one, to be solved by engineers. If it is to be solved right, the best engineering talent in the country must be employed on it and an organization developed that will operate with a degree of efficiency hitherto unknown in this country.

It is a problem of appalling magnitude. It will call for the organization, co-ordination and co-operation of the entire resources, material and mental, of the whole nation. There is question if the military authorities realize the extent of the problem of organizing the industries and the manpower of the nation to form an efficient auxiliary. A short time ago a letter was addressed to Congressman Frederick R. Lehlbach of New Jersey, inquiring whether or not any steps had been taken to ascertain what engineers were available for the manufacture of munitions, what were their qualifications, how quickly they would be avail-

able and other information which would enable the Government to commence immediately the supplying of the army and navy with the materials necessary to effective warfare. Mr. Lehlbach referred the inquiry to the War and Navy departments, which replied as follows:

The Opinion of the Military Authorities

WAR DEPARTMENT
WASHINGTON

Feb. 20, 1917.

Hon. Frederick R. Lehlbach,
House of Representatives.
Sir:

1. I beg to acknowledge the receipt by reference from the Secretary of War, of your letter of the 13th instant, addressed to him, referring to the suggestion of a civil engineer in your district that an index of engineers who would be available for services in time of danger could be prepared similar to the index of industrial establishments.

2. In response thereto, I beg to advise you that an index such as you describe is not being made, but in lieu thereof, engineers are being commissioned in the Engineer Officers' Reserve Corps, and in the Engineer Enlisted Reserve Corps. Those who are commissioned in this Reserve become immediately available for service in time of war and in time of peace they receive training which is calculated to prepare them for their duties in time of war. This is very much better than a simple list of engineers as you suggest and should eventually provide all the engineering talent that will be needed.

Very respectfully,
H. C. NEWCOMER,
Col. Corps of Engineers.

NAVY DEPARTMENT
WASHINGTON

Feb. 27, 1917.

My Dear Mr. Lehlbach:

Acknowledging your communication of Feb. 13th, in reference to the indexing of engineers available for services, I beg to inform you that the department is in receipt of numerous offers of services from individuals and engineers in every capacity.

Every such tender of service is acknowledged and carefully listed by the bureau having cognizance of the particular services offered.

In the case you suggest, the matter would be referred to the Bureau of Yards and Docks for listing and acknowledgment.

Sincerely yours,
(Signed) JOSEPHUS DANIELS, Secretary.

Hon. F. R. Lehlbach,
House of Representatives.

It is quite evident that the War Department, if Colonel Newcomer truly represents it, has failed to grasp the situation. It is apparent that it thinks of engineers in only the military sense and that it has little or no appreciation of the fact that an almost unlimited number of civilian engineers would be required to provide the means with which the military authorities and the military engineers could carry on effective warfare. Rifles and ammunition do not grow on bushes and there are other things beyond enlisting engineers for building fortifications, bridges, roads, water works and other military needs.

Although the navy does seem to have realized that civilian engineers can be of use to it outside of the functions of active service, it does not seem to have realized that it, too, will require the services of plants and industries and engineers outside of its own yards. Secretary Daniels's well-known aversion to having work done for the navy by private corporations may have blinded him to this fact. But it is absolutely true that the

*Consulting engineer, New York.

combined resources of all the private shipyards in the country would be none too great, should we become involved in a war with a first-class power.

What the Country Needs

It is apparent that the country needs leadership and intelligent planning for the utilization of its resources in the event of war. Let us examine what is to-day needed by an army in the field.

Confining ourselves to the army alone we have the following as absolute necessities: Rifles; field guns; machine guns; siege guns; trench mortars; bayonets; automatic pistols; rifle ammunition; high-explosive shells; shrapnel; hand grenades; time fuses; cartridge shells; artillery limbers; smokeless powder; asphyxiating gas; containers for the gas; liquid fire projectors; intrenching tools; field searchlights and power plants for them; illuminating bombs; field telephone sets, cables, poles, etc.; wireless telegraph apparatus; motor trucks; passenger automobiles; motor ambulances; tractors; light locomotives, steam and gasoline; industrial railway tracks; cars for light railways; aeroplanes; field kitchens; waste incinerators; water sterilizers for field service; mess equipment; photographic apparatus; range finders; surveying instruments; pontoons; bridge building material; road building equipment; portable buildings; wire rope; manila rope; barbed wire; piping; chains; steam engines; steam boilers; pumps; field blacksmith shops; surgical equipment; field cots; X-ray apparatus; storage batteries; horse harness; cavalry saddles; horse-shoes; clothing; tents; blankets; shoes; steel helmets; gas masks and so on. The writer confesses to no greater knowledge of military organization and affairs than the average American citizen who has followed more or less closely the progress of the European War. An army man could, no doubt, expand the list to double or triple its length, and if the needs of the navy are added, the list would be indefinitely lengthened.

The manufacture of all these articles in the quantities required by our present-day extremely moderate military establishment would be a large order. But once in war our present military establishment would be insignificant in comparison with the size of the army that must be immediately raised and equipped. The sudden expansion of these manufacturing requirements alone will be sufficient to disorganize our entire industrial regime and much work will have to be done before we can manufacture efficiently and in the quantity and quality needed in terms of an army of 1,000,000 to 5,000,000 men.

What We Shall Have to Do

We shall be confronted with the problems of supply of raw material, with transportation difficulties in getting this raw material to the plants and the finished products away from them. We shall be confronted with the necessity of developing methods of manufacturing in large quantities which would be quite different from the methods used for small orders. We will have to establish standards for the many articles required, and we will have to develop special machinery for making them. We will have to provide jigs, gages and fixtures in huge quantities and at once. These are but a few of the difficulties that we would have to face and overcome.

The Problem of Rifle Manufacture

As a concrete illustration of what war will mean from the manufacturing standpoint, we may con-

sider the furnishing of rifles for the army. Rifle making comprises a vast number of highly specialized machine operations which must be completed within narrow limits of accuracy. Nearly every operation is carried out by means of special tools and by labor trained to perform but that single operation. A large proportion of the 800 to 1000 machine operations involved in the manufacture of a military rifle requires special jigs and fixtures for holding the part while it is being machined. Now let us see what all this means when reduced to figures of war time production.

It has been estimated that an army on active service requires from three to six rifles for every infantryman. At the lower figure this means a minimum of 3,000,000 rifles for an army of 1,000,000 men. Producing 20,000 rifles per day we should need six months in which to equip the infantry of the first army. This assumes that we would be ready to commence manufacturing immediately upon the declaration of war. But we are far from ready to begin. The special machinery in the rifle factories manufacturing for foreign armies might be used, but we have not the gages, jigs and fixtures ready with which to make the United States army rifle in the quantities needed.

K. A. Juthe, in the discussion on industrial preparedness held at the New Orleans meeting of the American Society of Mechanical Engineers less than a year ago, stated that in the manufacture of rifles for foreign governments it was found that 300 first-class gage makers would need six months to make the first working set, the inspectors' set and the master reference set of gages for the manufacture of rifles in quantity. To make 10,000 rifles per day, the number of sets of working gages must be increased from 1 to 100 and the inspectors' sets from 1 to 50, requiring the services of from 3500 to 4000 first-class gage makers, for six months before we should be equipped in this one respect alone, to begin manufacturing on the scale required for an army of 1,000,000 men. And it is estimated that there are not over 3000 first-class gage makers in the country. Also it is quite probable that we should need an army much larger than 1,000,000 men.

Similarly an enormous amount of small tools, jigs and fixtures would be needed before rifle manufacture could begin. Mr. Juthe stated in the same discussion that it would take at least 1000 tool makers one year to make this equipment for the turning out of 1000 rifles per day. An army of 1,000,000 men would require the production of twenty times 1000 rifles per day with a corresponding increase in the number of jigs, fixtures, small tools and, consequently, tool makers. Where are these men to be found? Lacking them, one feature of our problem is to devise a means of producing the equipment without the services of skilled tool makers and gage makers, and producing it in a much shorter time than one year.

We have said nothing about the special machinery which would be necessary. This introduces another problem of the same character and one which would press for immediate solution. Here, too, a large supply of jigs, gages and fixtures would be needed, intensifying the already great strain on our tool-making resources.

It is true that a large number of our people now know how to make rifles, but it should be borne in mind that they know how to make Lee-Enfield and Russian army rifles and not the Springfield model of the United States. True, the experience with the Lee-Enfield and the Russian rifle would serve in good stead when they came to make the Springfield and they would learn to make it in a

much shorter time than was necessary for them to spend in learning to make the other rifles. Granting them every advantage, however, the fact remains that it will be necessary for them to equip with the small tools, gages, fixtures, etc., before they will be able to produce rifles for our army of 1,000,000 men or more.

It is quite evident that furnishing rifles promptly and in large quantities is a problem that is not to be quickly and easily solved. And we must remember that rifles are but one item out of a host which must be produced in the same or greater quantities. All the problems which are met in rifle manufacture will be met in greater or less degree in the manufacture of all the numerous items of equipment which the army will need, to say nothing of the navy.

Upon What Does the Answer Depend?

Those who have given any thought whatever to the problem of equipping the army and the navy realize that it is one depending largely upon man power, organization ability and technical skill. We have seen above the vast number of skilled workers that will be required for the preliminary operations alone, to say nothing of the enormous army of them that will have to be gathered for the actual making of munitions. The number of skilled workers in the country in the lines that are needed for making munitions of war are all too few, even for our needs in times of peace. There is no question that we will have to take the same steps that England and France took. We will have to train "one-job" workers, men and women, whom it would be hopeless to attempt to make into good all-around machinists, but who could be trained to do one thing and do it well and quickly. Here is another problem for our board of industrial strategy to meet.

How shall we select these workers? How shall we train them? Shall we use women in the factories, thus releasing men for the firing line and for other occupations unsuitable for women? These are hard practical questions which will have to be answered within a few weeks or a few days after the outbreak of the war. As a matter of fact and of national safety, the answer should be ready now.

How Shall We Manufacture?

The thousands upon thousands of different items of equipment will have to be manufactured all over the United States and the equipment made in one shop will have to be similar to and interchangeable with that made in another shop. This necessitates standardization and the formulation of specifications which will insure that these standards will be carried out. Are the methods of inspection which have been devised such as will reject everything unfit for use and yet not so narrow as to reject much that would be workable and usable? Quantity and reasonably good quality are the things to be sought for, not perfection. Again we have an engineering problem.

The problems which we have outlined above will have to be solved and solved quickly. We feel that they can best be solved by civilian engineers acting in co-operation with the military authorities. Several solutions can probably be found. From the number, the best and most easily worked plan can be devised. It is the duty of every engineer and every citizen who can contribute something to the solution of the problem to offer it. The writer presents his solution, not with the idea that it is the best, but as something which others, better qualified than he, can build upon.

(To be continued)

Hernia as an Accident

BY CHELSA C. SHERLOCK*

OUR workmen's compensation acts provide that there can be recovery by an employee for injuries by accident arising within the course of employment. The courts have defined a legal accident to be the same as the popular conception of it, namely, an unlooked for and unexpected event. When the compensation acts were adopted a multitude of questions of every conceivable character bearing upon them were presented to the courts; but perhaps no more interesting and important proposition has been debated than the question of whether hernia is an accident.

It can now be stated on the great weight of authority that a rupture caused by strain and over-exertion in the course of employment, is an accidental injury within the meaning of the workmen's compensation acts, and one for which compensation may be recovered. In one case it was shown that a workman was suffering from a cancer; but while engaged in furrowing heavy posts by pushing them forward against the knives of a machine by pressing his abdomen forcibly against the ends thereof, he sustained a rupture and died. The court held that the death was due to the rupture, and allowed recovery in spite of the fact that the workman was in a diseased condition because of his sufferings from the cancer.

The American courts have not been called upon to decide this proposition as often as have the courts of England. In fact, only two cases have been reported in this country touching upon this question. In each instance, however, our courts seem to support the doctrine of the English courts, as announced by their later decisions. The House of Lords has held that a rupture caused by over-exertion in an attempt to turn a wheel is an accident within the meaning of the English act. Likewise, where a man sustained a rupture in an effort to separate planks frozen together, it was held to be an accident. The English courts have even gone a step farther and have said that where some one is suffering from slight hernia, but is incapacitated by a greater injury which aggravates it, compensation may be recovered.

In another case in which a workman was operated upon for a rupture, the physicians operating for a former rupture at the same time, and the patient developed heart trouble and died some months later, compensation was allowed. Where a workman had been suffering from hernia for three or four years and was wearing a truss sufficient to prevent strangulated hernia, but was found in great pain and died shortly after, he was found to be suffering from an injury by accident arising out of his employment, and compensation was allowed.

It can be seen that the tendency of the courts is to lean very strongly toward the view that hernia under any and almost all circumstances is an injury by accident within the meaning of the compensation acts. It is consistent with good logic to say that no man could perceive of a possibility of rupturing himself and deliberately go about his work with that end in mind. Because of these facts, and the further consideration of the severity of this affliction, it is considered that the courts have taken a most liberal and humane view of the proposition.

Germany's November Pig-Iron Output

Germany's pig-iron output in November, 1916, is reported as 1,101,311 metric tons, against 1,161,005 tons in October. The daily output was 36,710 tons, against 37,452 tons in October. The November rate is the lowest since July, when it was 36,590 tons per day, with October the record month. The output in November, 1915, was 1,019,184 tons. The production last November was made up as follows: Foundry iron, 173,815 tons; Bessemer iron, 11,644 tons; basic or Thomas iron, 703,964 tons; steelmaking iron and spiegeleisen, 195,098 tons, and forge iron, 16,790 tons.

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PLAN TO BEAT SUBMARINES

Mosquito Fleet of Small Defensively Armed Cargo Boats Proposed

To defeat the object of the German submarine campaign so far as American commerce is concerned, at any rate, a proposal is now under consideration in high circles to launch innumerable small cargo boats, say of 1000 tons capacity each. The plan comprehends production on a very large scale, so far beyond what a single industrial establishment even formed for the purpose might undertake that it assumes the proportions of a governmental project. That it may be fathered either by the United States or perhaps the British Government remains to be seen. The quantity production of small cargo boats, armed fore and aft for defensive purposes, is the idea of a mining engineer, F. Huntington Clark, Roxbury, Conn., who is finding enthusiastic interest in so many quarters that it seems likely that something definite will be done in the near future.

The relative smallness of the individual vessel, whatever the standardized tonnage may finally be, is calculated to make it relatively easy to escape the observation of the submarines and will give it maneuvering qualities which are counted on to help it evade the submarine once it is discovered. As compared with a majority of cargo vessels, it will perhaps have a visibility so far as the submarine is concerned of one-third that of the larger vessel. This would mean the chance of being seen only within 10 miles as against say 30 miles for the larger vessel. A submarine would then have a lessened chance of overtaking the boat, and of course for a tonnage equal to the large boat, the submarine must discover many times more boats than it needs to otherwise. The plan would comprehend possibly the arming of every vessel both at bow and stern with guns, so that in addition to its low visibility and its capability of rapidly changing its course, even if special high speed is not provided, it has defensive measures.

It is held that if energetic measures are early taken designs may be standardized and large scale production entered on so that launching may begin late in the summer. In the meantime it is estimated that some 350,000 tons of ocean-going cargo vessels will be delivered by yards in this country, and that if England's production is equal to, if not double, this amount of ships, and the present rate of sinking is not greatly exceeded, the export of American products may be continued more or less indefinitely.

Owing to the difficulty of getting steel plates, it is probable that most, if not all these boats, will be built of timber hulls. An inventory is now being taken of the capacity of our shipbuilders for craft of this description, on the Pacific coast and on the Gulf as well as in the East, and a mark of 1,000,000 tons of shipping has been set up with output at an accelerating rate to provide the total quantity before the end of 1917. At an estimated cost of \$100 per ton burden, it will be seen that a total of \$100,000,000 may be involved, or about one-half the present daily cost of the war, all belligerents considered.

While the first cost of the ships, at least at the outset, may be returned by the first cargoes delivered, emphasis on the commercial aspect of the problem is given a secondary place to that of defeating the purpose of the undersea craft. From the standpoint of warfare as distinguished from the commercial feature of maintaining ocean traffic, the British Government is approached on a score that the promised production of the large numbers of small cargo boats will encourage Great Britain in combating the submarine warfare and that if these boats prove effective in evading the undersea craft the effect is calculated to be discouraging to Germany's unrestricted submarine campaign, with the result that perhaps not all of the boats need to be built.

From an industrial standpoint, the plan will probably require utilizing all points of production but at least a standardization, particularly in engines and general accessories. The vessels, it is held, should be equipped with Diesel engines, probably of 1000 to 1500 hp. for a speed of 14 knots, and one of the points con-

sidered is the use of a motive power which involves no smoke or smoke funnels. From a commercial standpoint it has been suggested that the shipping board recently brought into existence by Congress might support the project, particularly as it has available, if we mistake not, a sum of \$50,000,000 for the purpose of purchasing ships.

Railway Steel Spring Earnings

The fifteenth annual report of the Railway Steel Spring Company, covering the fiscal year ended Dec. 30, 1916, shows net earnings of \$4,022,590.50, as compared with \$1,688,465 in the preceding year. The income accounts for these two years are as follows:

	1916	1915
Gross earnings, all sources.....	\$14,086,499	\$7,043,957
Manufacturing, operating, maintenance, repairs, administrative expenses, depreciation, etc.	10,063,908	5,355,492
Net earnings	4,022,590	1,688,465
Interest on Latrobe and Inter-Ocean Bonds	311,784	325,237
Dividends on preferred stock.....	945,000	945,000
Dividends on common stock.....	168,750
Reserved for plant improvements, betterments and retirement of bonds...	1,000,000
Surplus for the year 1916.....	1,597,056	418,228
Surplus, December 31, 1915.....	4,372,885	3,954,657
Total surplus, Dec. 31.....	\$5,969,941	\$4,372,885

The following are extracts from the statement of President F. F. Fitzpatrick:

"The improved conditions existing during the latter part of 1915 continued throughout the year 1916, and the plants of the company have been operated to their fullest capacity all of the year, manufacturing its regular line of production, of which a considerable volume has been sold for export, resulting in larger earnings, both gross and net, than in any other year since the incorporation of the company. To meet the demands of this additional business, necessary alterations to the properties have been made and the capacity for output of manufactured material has been increased. The favorable conditions in the company's business are still prevailing, and the outlook for the year 1917 continues promising."

Objections to Adopting the Metric System

That the adoption of the metric system would result in the changing of established units of measurements by lengthening or shortening them arbitrarily without reference to practical needs was brought out in a paper on "Our Units of Measurement and Their Relation to the Metric System," recently presented before the drafting and engineering section of the Providence Engineering Society by Luther D. Burlingame, industrial superintendent of the Brown & Sharpe Mfg. Company. The advantages of being able to calculate by simply shifting the decimal point were not sufficient, in his opinion, to outweigh the disadvantages of having to revise our entire system and do considerable work in the rewriting of technical literature, as well as revising important work such as that of the Coast and Geodetic Survey, for example. The names of our present weights and measures, he said, had such an advantage in brevity and in seeming to fit what they stand for that this would offset very materially any advantage in calculation, especially when it is necessary to use the long names of the units of the metric system.

The Sullivan Machinery Company, Chicago, in its report for 1916 shows net earnings of \$1,313,906. After payment of dividends and reservations for further dividends, a balance of \$603,558 was added to surplus. An extra dividend of 1 per cent, in addition to the regular quarterly disbursement of 1½ per cent, has been declared payable April 16.

The Nova Scotia Steel & Coal Company reports for the year ended Dec. 31, 1916: Gross profits, \$4,222,373; net profits, \$2,104,478, after deducting interest charges amounting to \$627,309 and after allowance of \$1,490,586 for depreciation, business profits tax, reserve for doubtful accounts and patriotic contributions.

Submarine Warfare Restricts Exports

February Is Expected to Show a Loss of 50 Per Cent—Increased Prices Reflected in Heavy Gain in Values of Products Sent Abroad in January

WASHINGTON, D. C., March 6, 1917.—Advance reports from the leading ports of entry which have reached the Bureau of Foreign and Domestic Commerce indicate that the resumption of unrestricted submarine warfare by Germany operated to curtail general exports during February at least 50 per cent. Whether, in view of the special efforts made by the entente allies to maintain the supply of war material in spite of submarine activity, the shipments of iron and steel will show a

of last September, when the peak of the export movement seemed to have been reached. Shipments of tonnage commodities and of machinery and machine tools, however, while showing notable increases over recent months, fell short of the high records, this apparent inconsistency being explained by the continued rise in the prices of iron and steel commodities and the fact that the gain in total values is due in part to increases in the exports of miscellaneous iron and steel products, including shells and unloaded shrapnel, which are not embraced in the figures for tonnage commodities.

The total exports of iron and steel products in January showed a gain as to values of 110 per cent over January, 1916, and advanced 18 per cent over the high record of September of last year. Tonnage commodities gained 70 per cent over January, 1916, but though exceeding the figures of the preceding three months, fell 5.5 per cent short of the unprecedented record of last September. Shipments of machinery in January gained 69 per cent over the same month a year ago and fell but 2.8 per cent short of the high-water-mark reached last August. Shipments of machine tools made a notable increase in January, exceeding by 158 per cent the exports of the same month a year ago and breaking all previous monthly records except those of May and June, 1916, falling 16 per cent short of May's high total.

For the seven months ended January, the total exports of iron and steel surpassed by 101 per cent the corresponding period of 1916, which in turn exceeded any previous record by nearly 100 per cent. Shipments of tonnage commodities rose 52 per cent above the record for 1916, which was far in advance of any previous corresponding period. Machinery gained 58 per cent and machine tools nearly 100 per cent over the seven months of 1916, which exceeded all previous records.

The value of all shipments of iron and steel products in January, 1917, was \$108,423,640 as compared with \$51,643,807 for the same month of 1916 and \$18,053,421 for January, 1915. The highest previous record was made in September 1916 when the total value of the shipments was \$90,895,592. For the seven months

Exports of Iron and Steel

	January		Seven Months	
	1916, Gross Tons	1917, Gross Tons	1916, Gross Tons	1917, Gross Tons
Pig iron	18,719	69,146	156,022	522,987
Scrap	16,681	23,012	75,495	136,881
Bar iron	5,997	5,172	36,398	39,136
Wire rods	8,105	7,468	98,054	84,172
Steel bars	58,402	57,359	292,132	465,059
Billets, ingots and blooms, n.e.s.	55,315	183,656	419,500	1,094,116
Bolts and nuts	2,336	3,130	18,710	17,944
Hoops and bands	3,399	4,753	22,654	25,973
Horseshoes	786	103	8,917	2,917
Cut nails	229	288	2,748	3,153
Railroad spikes	1,792	2,075	12,464	10,227
Wire nails	10,999	7,225	67,541	85,194
All other nails, including tacks	525	1,637	6,309	9,942
Cast-iron pipes and fittings	6,136	5,157	29,127	45,821
Wrought pipes and fittings	8,704	11,857	77,685	113,565
Radiators and cast-iron house heating boilers....	149	205	1,503	1,624
Steel rails	38,122	76,493	334,909	375,711
Galvanized iron sheets and plates	5,120	9,203	44,898	55,050
All other iron sheets and plates	3,364	4,101	22,412	27,014
Steel plates	23,742	33,904	169,786	190,904
Steel sheets	7,428	10,304	56,600	65,775
Structural iron and steel...	19,482	28,590	289,414	201,870
Tin and terne plates....	12,178	23,408	116,729	127,959
Barb wire	33,962	17,304	193,017	230,989
All other wire	15,449	17,736	141,200	155,822
Total	357,121	608,286	2,697,224	4,089,805

shrinkage proportionate to the decline in exports of general merchandise, cannot be foreshadowed.

Exports of iron and steel by values during January not only scored a heavy gain over the closing months of 1916 but surpassed by 18 per cent the high record

Exports of Machinery

	January		Seven Months	
	1916	1917	1916	1917
Adding machines	\$83,996	\$142,286	\$439,155	\$851,277
Air-compressing machinery	26,677	97,492	306,697	686,943
Brewers' machinery	1,370	1,205	19,605	5,629
Cash registers	85,515	124,452	732,603	956,867
Parts of	14,907	10,337	68,518	83,108
Cotton gins	7,582	9,362	38,565	74,274
Cream separators	62,983	39,141	269,748	160,707
Elevators and elevator machinery	84,225	179,358	785,799	1,187,840
Electric locomotives	151,245	63,545	245,486	318,848
Gas engines, stationary	95,540	65,527	263,802	290,568
Gasoline engines	751,404	1,626,990	4,423,507	8,420,438
Steam engines	2,248,231	943,654	11,151,462	7,784,853
All other engines	273,970	336,435	828,430	2,293,990
Parts of	644,533	2,532,295	3,714,109	12,005,906
Laundry machinery, power	12,619	38,004	155,443	185,990
All other	19,017	20,092	168,674	200,791
Lawn mowers	24,820	12,085	94,467	96,320
Metal-working machinery (including metal-working tools)	3,249,595	8,326,609	25,196,917	48,657,760
Meters, gas and water	28,809	42,340	140,482	227,564
Milling machinery (flour and grist)	197,351	121,228	1,584,442	802,350
Mining machinery, oil-well	92,804	109,246	657,531	1,322,046
All other	394,396	1,048,087	3,767,605	5,428,135
Paper-mill machinery	56,649	149,733	573,419	1,093,769
Printing presses	161,780	170,110	871,152	1,218,576
Pumps and pumping machinery	359,587	512,665	2,519,361	3,588,551
Refrigerating and ice-making machinery	51,883	84,749	430,484	458,628
Sewing machines	495,157	522,552	3,092,705	3,305,364
Shoe machinery	73,413	143,973	822,388	740,378
Sugar-mill machinery	420,240	932,278	4,902,091	8,484,985
Textile machinery	172,679	277,988	1,216,874	2,158,392
Typesetting machines	49,328	96,977	325,808	631,216
Typewriting machines	706,347	1,151,104	4,654,166	6,839,793
Windmills	66,455	66,697	554,272	465,602
Wood-working machinery, sawmill	23,689	38,876	171,288	283,947
All other	60,947	116,356	706,630	569,604
All other machinery and parts of	3,022,800	3,811,622	16,625,014	24,854,026
Total	\$14,324,426	\$23,965,450	\$92,518,708	\$146,730,247

ended January, 1917, the total was \$604,574,281 as compared with \$300,977,402 for the same period of 1916 and \$155,107,704 in 1914 the largest previous total for this period.

Exports of Machinery

Exports of machinery in January were valued at \$23,965,450 as compared with \$14,324,426 for the same month of 1916. August still leads in the exports of machinery with a total of \$24,657,597. Shipments of metal-working machinery in January aggregated \$8,326,609 as compared with \$3,249,595 for the same month of 1916. The record in exports of metal-working machinery was made in May, 1916, when the total was \$9,935,806. Exports of machinery of all kinds for the seven months ended January, 1917, were valued at

Imports of Iron and Steel

	January		Seven Months	
	1916, Gross Tons	1917, Gross Tons	1916, Gross Tons	1917, Gross Tons
Ferromanganese	599	6,211	2,513	49,356
Ferrosilicon	8,823	891	64,351	4,075
All other pig iron	4,596	2,326	70,934	30,601
Scrap	369	28,066	4,803	114,431
Bar iron	164	47	739	3,895
Structural iron and steel	20	197	470	664
Hoop or band iron	20	1,421	3,459	3,797
Steel billets without alloys	564	462	5,389	8,543
All other steel billets	455	271	38,425	10,596
Steel rails	146	265	953	1,094
Sheets and plates	42	31	344	518
Tin and terne plates	26	3	2,575	2,063
Wire rods	15,824	40,191	194,955	229,633

\$146,730,247 as compared with \$92,518,708 for the corresponding period of 1916, which was the record total for this period. Details of the exports of machinery for January, 1916, and 1917, and for the two seven months' periods are given in the accompanying table.

Exports of Iron and Steel

The exports of iron and steel for which quantities are given aggregated 608,286 gross tons in January, 1917, as compared with 357,121 tons in the same month of 1916. Maximum exports of tonnage commodities were recorded last September, when the total was 643,763 tons. For the seven months ended January, 1917, shipments aggregated 4,089,805 gross tons as compared with 2,697,224 tons for the same period of 1916. An accompanying table shows the exports for January and for the seven months ended January, as compared with 1916.

Imports of Iron and Steel

The imports of tonnage iron and steel in January made a heavy gain over the same month a year ago, the increase being due almost entirely to imports of scrap. Ferromanganese also appears as a substantially independent item, having been segregated from "all other pig iron." The total imports of tonnage iron and steel in January aggregated 40,191 tons as compared with 15,824 tons for the same month of 1916. The imports for the seven months ended January, 1917, were 229,633 gross tons as compared with 194,955 tons in 1916. The accompanying table shows the imports of tonnage commodities for January, 1917, and for the seven months ended January as compared with 1916.

W. L. C.

Barb Wire Exports Very Large

Exports of barb wire from the United States in 1916 reached the tremendous total of 418,882 gross tons, or at the rate of 34,907 tons per month. This total was nearly twice that of 1915, which was 248,611 tons. The 1916 exports were five times those of 1913—a normal year—when they were 82,050 tons. In the last three months these exports have decreased, having been 23,528 tons in November, 15,820 tons in December, and 17,304 tons in January this year. The value of the 1913 exports was \$4,267,476, and of the 1916 exports \$31,230,905.

Smaller British Steel Exports

British exports of iron and steel are of comparatively small proportions, even considering some of the war months of 1915 and 1916. In January, 1917, the total, excluding iron ore but including scrap, was only 210,124 gross tons. While this exceeds the previous month—December, 1916, whose total was 158,609 tons—the figures are the lowest otherwise since February, 1915, when they were 198,804 tons. In fact, in August, 1914, these exports were only 211,601 tons. The average for 1916 was 279,819 tons per month.

Pig-iron exports in January were 51,372 tons, of which France took 36,472 tons. In January, 1916, they were 70,313 tons, and the average for 1916 was 65,839 tons per month. Ferroalloy exports, principally ferromanganese, were 9829 tons in January, against 10,611 tons per month in 1916.

Steel-bar exports in January were comparatively small—26,293 tons—France taking 19,044 tons of this. The rate in 1916 was 51,429 tons per month, France absorbing 43,324 tons per month. Rail exports in 1916 were only 4189 tons per month and the January, 1917, exports were at a greater rate, being 5935 tons. The shipments of tin plates in January were 16,515 tons, while the rate in 1916 was 26,809 tons per month. The outgo of galvanized sheets was at a still lower rate in January—3501 tons, compared with 9767 tons per month in 1916.

Imports continue to decline. In January, 1917, they were 42,974 tons, excluding iron ore but including scrap. This total compares with 45,119 tons in December, 1916, and with a monthly rate in 1916 of 72,740 tons, which was only two-thirds of the 1915 rate. The importations of blooms, billets and slabs in 1916 were at the rate of 12,178 tons per month, but in January this year they were only 6485 tons. The United States furnished 5539 tons of the latter. Steel ingot imports were only 569 tons in January, comparing with 149 tons per month in 1916.

Lake Superior Iron Ore in 1916

Lake Superior iron-ore shipments by mines in 1916, according to the *Iron Trade Review*, were 66,658,466 tons as compared with 47,272,751 tons in 1915. This is an increase of 19,385,715 tons, or 41.01 per cent. The increase in 1915 over 1914 was 44.43 per cent. The all-rail shipments were 1,924,268 tons or double those in 1915 which were 953,947 tons. The season's total Lake shipments of 64,734,198 tons were given in THE IRON AGE, Dec. 21, 1916. The shipments by ranges for four years were as follows in gross tons:

	1916	1915	1914	1913
Marquette	5,396,007	4,105,378	2,491,857	3,966,680
Menominee	6,364,363	4,982,626	3,221,258	4,965,604
Gogebic	8,489,685	5,477,767	3,568,482	4,531,558
Vermillion	1,947,200	1,733,595	1,016,993	1,566,600
Mesaba	42,525,612	29,756,689	21,465,967	34,038,643
Cuyuna	1,716,218	1,136,113	859,404	733,021
Miscellaneous	219,381	80,583	105,765	145,010
Total	66,658,466	47,272,751	32,729,726	49,947,116

The 1916 shipments establish a record, the nearest approach having been in 1913 when the total was 49,947,116 tons. Nor have the all-rail shipments ever been as large as last year. The next largest rail shipments were 1,052,173 tons in 1906.

For the fifth consecutive year, the independent companies forwarded from the Lake Superior district more than those of the United States Steel Corporation. In 1916 they shipped 52.48 per cent of the total against 52.37 per cent in 1915. This is the largest since the Steel Corporation was formed. Last year the Corporation's shipments were 31,673,131 tons or 47.52 per cent, which is this company's lowest record, the highest having been 56 per cent both in 1907 and 1908.

The Mesaba range's shipments were, of course, the largest at 42,525,612 tons last year or 63.80 per cent of the total. This compares with 29,756,689 tons or 62.95 per cent in 1915. The Cuyuna range's contribution to the total continues to grow. In 1916 it was 1,716,218 tons compared with 1,136,113 tons in 1915, when the total exceeded 1,000,000 tons for the first time.

2½ x 4½ x 9-in. brick they contain 17,970 sq. ft. Other comparative data is also offered showing that the area of flue opening in the standard flue after 1 in. or 1½ in. of dust has accumulated is relatively much smaller than in the like case as applied to the Orth checkerwork flue.

Book Reviews

Principles of Labor Legislation. By John R. Commons and John B. Andrews. Pages 464, 5 x 7½ in. Published by Harper & Brothers, New York. Price \$2.

John R. Commons, professor of political economy, University of Wisconsin and former member Industrial Commission of Wisconsin and a member of the recent United States Commission on Industrial Relations, and John B. Andrews, secretary of the American Association for Labor Legislation, are joint authors of this historical and descriptive account of the legal, social and economic phases of labor legislation. In summing up the legal problem which must be faced and comparing the ordinary contract with the contract to labor, the authors say that the wage bargain "is a bargain which involves not only wages but also hours of labor, speed and fatigue, safety and health, accidents and disease, even life itself. Unemployment is failure to make such a bargain; immigration, child labor, education, prison labor, collective bargaining, etc., are conditions which determine the bargaining power of the laborer," and "it is because a large class of people have come to depend permanently, not on their property or resources, but on these bargains with property owners, that labor legislation has significance." The authors sketch the gradual encroachment of society on individual right and deal in full with the due process of law guarantee contained in the constitution, the division of power between the Federal and State governments and the powers relegated to the executive, legislature and judiciary.

The development of the labor problem is traced from the status of master and servant to the relation of employer and employee. This development is described under the general heading of individual bargaining which includes servile labor, indentured service, apprenticeship, etc., the position of the laborer as creditor, tenant and competitor and his legal aid.

A third chapter deals with collective bargaining, including the law of conspiracy, mediation by the government, coercion by the government and unions of government employees.

The remaining chapters are concerned with the minimum wage, hours of labor, unemployment, safety and health, various forms of social insurance, and administration. Each of these subjects is developed from the legal, social and economic viewpoints. A select critical bibliography and a table of cases cited are appended. The volume is substantially a text and reference book for the student and general reader.

Unified Accounting Methods for Industrials. By Clinton E. Woods. Pages 466, 5½ x 8½ in.; numerous charts, graphs and forms. Published by The Ronald Press Company, New York. Price \$5.

An interesting feature of this work is the general view of efficiency management which occupies the first part of the book. As the author says, it is sometimes of value to picture a house before building it, and a description of how the manager goes about his work and what he accomplishes is of great value in introducing to the student or general reader the complex factors which must be directed scientifically. The work is written for the executive, engineer and accountant, who together are responsible for the general efficiency of a management system. The author writes, "There are somewhere near 400,000 manufacturing concerns in this country to-day whose methods of handling the same industrial problems are as diversified as are the things they make and the men who make them." The system results in "gambling" with inventions, obsolete materials, equipment, new superintendents, foremen and workmen and finally in meeting his competitor's price who in turn is doing exactly the same thing, with the result that they both fail.

The author tells of specific cases of plants which have been reorganized and of the savings and gains which resulted. He points out that a scientific method must be dominated by a manufacturing and not a sales policy. An analysis of the balance sheet is made from the standpoint of the financier, executive and manager. A pay day four times a month instead of once a week is suggested to save clerical labor.

Chapter 8 takes into consideration the analyzing and grouping of machine tool equipment, including operation and motion studies. Some ninety-five forms illustrating the context are grouped in the back of the book. The volume gives a clear and interesting exposition of the subject, is carefully compiled and neatly arranged.

Export Trade Directory.—Compiled under the supervision of B. Olney Hough, editor *American Exporter*. Pages, 536, 6 x 9 in. Published by the Johnston Export Publishing Company, 17 Battery Place, New York City. Price \$5.

The fifth edition of this reference book of the export trade keeps pace with the increase in the foreign business of the United States. The book has been revised and enlarged 50 per cent and now includes over 2000 firms. The directory of export merchants, manufacturers' agents, foreign exchange bankers, foreign freight forwarders, steamship lines, etc., has been brought up to date and the means of approach to this field by manufacturers and others desirous of increasing their export business has been facilitated by giving lists of export houses classified according to goods shipped and markets cultivated and by the addition of the trade ratings of important houses, which is a new feature. Specifications of shipping routes to foreign markets arranged for easy reference, the location of American consuls abroad and of foreign consuls in the United States are given to aid in the direct handling of foreign business. In connection with the export houses, the year of its establishment, address, telephone number, cable address, codes used, list of branches and the foreign markets and goods exported or imported, etc., are given.

Manufacturing Costs and Accounts. By A. Hamilton Church. Pages 447, 5½ x 9 in.; illustrations, 139. Published by the McGraw-Hill Book Company, Inc., New York. Price \$5.

The author's object is to present to the student of cost accounting a simple view of the general structure of cost accounts, the why and wherefore, rather than a detailed description of specific systems. A sharp line is drawn between the management of cost accounting and administration, the latter phase not being dealt with in this volume.

In adopting a cost system the questions to be taken into consideration, in the author's review, are the use of the direct material and the direct labor and the expense incurred. This method of questioning would result in the adoption of a machine-rate system and the elimination in most cases of systems in which labor and expense are averaged. The advisability of keeping the cost of manufacturing a product and the cost of selling it completely separate is touched upon in a chapter on sales and selling expense. The solution of the difficulty arising from the over-lapping of these departments must be provided by some mechanism whereby the time devoted to factory business is separate from that devoted to selling business. The work of correspondents, clerks and bookkeepers should be minutely classified and the duties of the president and administrative officers should be divided as closely as possible. "The secret of correct cost keeping," says the author, "is departmentalization." Mr. Church's definition for interest in this use is "a charge made to production for the use of capital." The author prefers to include in cost the interest charges on all buildings, plants and equipment, especially when using the machine-rate method, although he calls attention to the fact that many authorities disagree with him.

The third part of the book includes a series of articles primarily applicable to machine shops. Writing on idle machines the author points out that the foreman should have at his command statements of the earnings

and working time day by day for each machine, in order that a non-producing machine may be easily detected. This part of the book deals concisely with the nature of reports and returns for foremen, superintendents and executives. The author has prepared his book with great care.

Modern Shop Practice. Pages 2300, 5½ x 8 in., in six volumes; 2500 illustrations; sixth edition, revised and enlarged. Published by American Technical Society, Chicago. Price \$17.80.

This work is a comprehensive cyclopedia of shop tools and methods. Innumerable topics are touched, many of them very tersely, much dependence being had on the many illustrations. Necessarily, many subjects on which books could be written are dismissed with a paragraph conveying but a general idea. Howard Monroe Raymond, dean of engineering, Armour Institute of Technology, is editor-in-chief of the work, to which twenty-three men eminent in their respective fields contributed as authors or collaborators, while over thirty authorities additional were consulted. How inclusive is the scope of the cyclopedia is indicated by the titles of the volumes, as follows: Machine Shop Practice, Production, Manufacturing; Management, Metallurgy, Welding, Die-Stamping; Tool-Making, Jigs-Fixtures, Tool Design, Dies-Gages; Foundry Work, Molding, Casting, Forging; Pattern-Making, Mechanical Drawing; Machine Drawing, Auto Work, Index.

The basic idea of the work is that the skilled mechanic of to-day is a specialist, and that he needs a standard reference work to assist him in shop lines with which he is not familiar. Even the common hand-tools of the machinist are described and illustrated, preliminary to the description of the operation of the complicated modern machine tools. Many helpful suggestions are contained for those seeking to improve production methods. For the student each volume contains review questions.

Selling Your Services. Published by the Sales Service Company, New York. Pages about 100, 5½ x 8 in. Price \$1.

"Selling Your Services" applies methods of selling to the seeking of a job. The authors write from personal experience, having followed the methods outlined in obtaining their own positions, and they claim they have had the opportunity to observe how badly the average applicant handles his case. Some kind of employment as a definite anchorage and an inventory of personal qualifications are held to be prerequisites for seeking a job. Methods of locating openings and of obtaining interviews, letter forms and suggestions for attracting and renewing the employer's attention occupy the greater part of an attractively arranged volume.

Poor's "Manual of Railroads" (fiftieth annual number) has just been issued, and is the first 1917 manual offered to the public. It contains statements of companies for the year ended June 30, 1916, and also all important information furnished the compilers up to the time of going to press. A prominent feature shows the margin of safety over interest and dividend requirements of individual stocks and bonds. No opinion of value is given, but all the essential facts appear from which an opinion may be formed. The bond revisions for 1917 are very much enlarged and improved, as compared with those of the previous issues. The fiftieth annual number is believed by the compilers to be the most useful volume of the series, and they aim to have it made a part of the equipment of every financial institution and investment house.

Safety in connection with cranes has been made the subject of the fourth bulletin of the National Safety Council under its "Safe Practices" series. Besides covering the general construction of a crane from the safety standpoint and enumerating at length the rules which should be observed in crane operation, the bulletin carries some drawings of cranes properly safeguarded and illustrates standard methods of signaling to the crane operator.

Donner Steel Company's Report

The first annual report of the Donner Steel Company, Inc., Buffalo, for the period ended Dec. 31, 1916, shows net earnings of \$1,166,058.41. A 7 per cent dividend totaling \$149,226.42 was declared on the preferred stock of \$2,500,000. On Dec. 26, 1916, a special meeting of stockholders authorized an increase of capital stock to \$9,000,000, making a total of \$6,000,000 preferred and \$3,000,000 common. The statement submitted by W. H. Donner, president, presents the following income account:

Total net earnings after expenses incident to operations, including ordinary repairs and maintenance (approximately \$293,000) and interest on bonds of subsidiary companies....	\$1,166,058.41
Less:	
Provision for depreciation.....	350,242.51
Interest on bonds and floating debt.....	119,126.51
Net income	696,689.39
*Preferred dividend	149,226.42
Carried to surplus.....	\$547,462.97

*At the rate of 7 per cent per annum from respective dates of payment for stock to Dec. 31, 1916.

The consolidated balance sheet, as of Dec. 31, 1916, is as follows:

Assets	
Real estate, buildings, equipment, etc.....	\$8,141,204.50
Deferred charges:	
Payments for advance mining royalties, unexpired insurance, etc.	38,309.21
Payments on account of Tonawanda plant...	43,556.36
Current assets:	
Inventories	2,019,112.88
Cash	346,761.56
Accounts receivable	1,080,990.46
Total	\$11,670,234.97
Liabilities	
Preferred stock	\$2,500,000.00
Common stock	2,500,000.00
First mortgage bonds (\$5,000,000 authorized) ..	2,500,000.00
Bonds of Donner Steamship Company.....	92,000.00
Current liabilities:	
Accounts payable	1,117,465.95
Bills payable	2,200,000.00
Bond interest accrued	10,416.66
Preferred dividend	149,226.42
Reserve fund:	
For relining furnaces, extraordinary repairs, etc.	53,062.97
Surplus (earned)	547,462.97
Total	\$11,670,234.97

With regard to the seven open-hearth furnaces, the second blast furnace and the finishing mills now being built, President Donner says: "It is expected that two of the new open-hearth furnaces will be in operation in March, 1917, the new blast furnace in April and the plate mill in May. With the orders on hand and the demand for steel products practically assured through 1917, these improvements should add materially to the profits. It is an exceedingly difficult time to secure machinery and construction materials. The remaining open-hearth furnaces and mills will be completed and put in operation as rapidly as possible."

Technical Journals Consolidate

A consolidation of technical publications in Chicago has been made under the International Trade Press, Inc., which includes the *Electrical Review* and *Western Electrician*, the *Electrical Blue Book* and the *Cement World*. C. A. Tuppe is president, Lyman A. Sisley, secretary-treasurer and Charles W. Price, vice-president. The latter will have charge of the corporation's Eastern business with headquarters at 13 Park Row, New York.

The U. T. Hungerford Brass & Copper Company, whose main office and warehouse are in the Hungerford Building, Lafayette, White and Franklin Streets, New York, has opened a warehouse in Baltimore, at Lombard and South Streets, where a complete stock for immediate shipment will be carried of brass, copper, bronze, German silver and other metals in various forms. It is believed that the Baltimore warehouse will furnish an appreciated opportunity for buyers of such products in the Southern States.

Corporation Makes Vigorous Defense

Brief Fully Reviews Allegations of the Government—Discusses Gary Dinners and Pools—Declares Prices Have Not Been and Are Not Controlled

The brief of the United States Steel Corporation in the dissolution suit was filed in the Supreme Court of the United States at Washington, March 3, by Richard V. Lindabury, Cordenio A. Severance, Raynal C. Bolling and David A. Reed, counsel. It is a volume of 369 pages, and discusses at length all the important issues involved.

The petition in this case was filed Oct. 26, 1911, against the Steel Corporation and 12 of its constituent companies, charging violation of the Federal anti-trust act and asking for injunction, dissolution and general relief. After the filing of an elaborate answer by the corporation, the case was referred to an examiner and the taking of testimony continued at intervals from May 6, 1912, until March 27, 1914. The testimony and exhibits fill 57 printed volumes containing 15,927 pages.

The case was heard by Circuit Judges Buffington, McPherson, Hunt and Woolley, and after six months' consideration the judges filed two opinions. While they differed in their conclusions on some of the points presented, and united in criticising the Steel Corporation for joining with its competitors in the so-called Gary dinner movement inaugurated during the panic of 1907, they were unanimous in finding that the Steel Corporation was not and never had been a monopoly, that it never attempted to restrain trade except by co-operation with its competitors and that such attempts had been abandoned. They consequently united in a decree dismissing the petition. From that decree the present appeal is taken.

The brief discusses the meanings of the terms "monopolize" and "restraint of trade" as used in the anti-trust act, and as established in the leading cases on the subject, quoting at length from important decisions and holding that it cannot in reason be said that a combination of manufacturing concerns whose percentage of production did not exceed 50.1 and whose acquisition of raw material supply did not exceed its reasonable requirements, and did not approach to monopoly, must necessarily have operated to restrain trade or in and of itself must necessarily have amounted to a monopoly or an attempt at monopolization. Among the decisions quoted is the opinion of the court in the American Tobacco Company case, in which the judges said that wrongful purpose and illegal combination were overwhelmingly established and described the course of conduct intended to drive competitors out of the field and to monopolize the tobacco industry. The brief holds that the contention of the Government that the suppression of competition is undue whenever the combination controls units which together occupy a preponderant position in a given industry, and this without regard to the intentions of those who from it or the after conduct of the combination, is not tenable. The brief asserts that in no case has the acquisition of a percentage as small as that acquired by the Steel Corporation been held in and of itself to evidence an illegal intent. It is declared that in the Standard Oil, Tobacco and Reading cases the percentages of business acquired or controlled were very much greater than in the present case, yet wrongful intent was not held to be proved by that fact alone, but by other circumstances.

Were Prices Controlled?

It is claimed in the Government's brief that the fall in prices in 1896 and 1897 was due to normal competitive conditions; that the rise in prices in 1898-1900 was caused by the formation of the companies afterward acquired by the Steel Corporation; that their control of prices began to wane, and that the corporation was formed to restore it. The brief dwells at great length on this subject, and while admitting that a sharp increase in prices followed shortly after the organization

of some of the constituent companies, asserts that it is not correct to say that the low prices of 1896-7 were the result of normal competitive conditions, or that the increases in 1898-9 were the result of the organization of these companies, for the earlier period was one of great industrial depression and the later period one of corresponding exaltation. All the allegations made by the Government in connection with the organization of the corporation are reviewed, and it is asserted that there is nothing to show or even tending to show any purpose to monopolize or restrain trade.

Turning to the consideration of the question whether intent to monopolize or restrain trade is shown by the after conduct of the Steel Corporation, the brief examines the practices of the corporation and shows what the corporation has done toward accomplishing the objects for which it was organized. Among the accomplishments are cited economies effected in the manufacture and distribution of steel products; development of the steel trade generally, and development of foreign trade. The brief also discusses the corporation's treatment of competitors and examines and quotes from the testimony of competitors concerning its fair dealing. Recurring to the subject of prices, the brief says: "Disregarding general business conditions, and the rise and fall of demand for steel products, the Government treats each ebb of prices as sure evidence of a renaissance of competition and each flow as sure evidence of restraint of trade. It treats the savage commercial warfare during the acute depression of 1897 and 1898 as a standard of desirable conditions of normal business, and against that standard it sets in contrast the prices that prevailed during short, arbitrarily selected periods in the life of the Steel Corporation. It neglects to point out that during those two earlier years the prices of steel, as well as of general commodities, were lower than ever before or ever again in the history of the country. And it disregards all of the proof in respect to general commodity prices, which show that the purchasing power of steel—the ratio of its price to the price of general commodities—was lower when this action was commenced than ever before without any exception."

The Gary Dinners

Pools before and after 1901, structural, plate and steel shafting associations, Gary dinners and Gary committees are discussed at length and it is argued that there is nothing in the conduct of the Steel Corporation to justify the charges made by the government. In the Government's petition it was stated that the Government did not claim that merely assembling and mutually exchanging information and declaration of purpose amounted to an agreement or combination in restraint of trade. "In the court below," says the brief, "the government succeeded in persuading the judges that the manufacturers at the Gary dinner meetings went further than merely to exchange information and announce prices, and that they actually reached understandings, although informally, on the subject of prices. But as all the judges agreed that such understandings, instead of evidencing power, evidenced the want of it, the Government now faces about and instead of claiming, understandings' insists that the corporation simply led the other manufacturers to adopt and maintain its own prices, and that the significance of this consists not in its illegality, but in the way in which it illustrates the overshadowing influence of the combination in the entire steel industry.

"That the corporation did not lead or influence its competitors to follow its prices for except a few months after the panic of 1907, even to maintain their own," says the brief, "is conclusively shown by the uncontradicted testimony of a multitude of witnesses. More-

over, we deny that mere influence or leadership is made a crime by the anti-trust act or a test by which the violation of its provisions is to be determined. By what standard is such leadership or influence to be measured? How great must it become before it ceases to be a virtue and becomes a vice?"

In conclusion, the brief refers to the policy of the Steel Corporation in keeping the public and the Government fully informed as to its course of conduct and as to its policies and, relying on the apparent approval of the Government and the public, has gone on spending hundreds of millions of dollars in the development of its domestic and foreign trade to the advantage of its employees, its customers and the general public and without injury to its competitors or others, while over 150,000 persons have invested their savings in its stock, included among whom are some 50,000 of its employees.

"It is not necessary," says the brief, "to claim that these circumstances worked an estoppel against the government, but we do claim that they indicate a contemporaneous judgment in favor of the integrity of the organization and management of the Steel Corporation by those whose duty it was to judge, and that such judgment ought not to be overturned at this late date, after rights of so important a character have grown up in reliance upon it, except for the most cogent and persuasive reasons."

Magnesioferrite—Artificial Austrian Magnesite

Austrian magnesite has been generally conceded as unsurpassed for refractory purposes in steel metallurgy, and no other deposits have thus far been found which seem to possess the same physical or even chemical characteristics. Its loss to the American steel industry because of the war has been a serious one involving many difficulties in securing a proper material, either as brick or otherwise, for furnace linings. After calcining it is said to contain about 5 to 10 per cent of oxide of iron which seems to bestow some of the unusual properties on it. Some call it a magnesioferrite ore.

Attempts to reproduce or imitate this natural compound have been many. A process has been patented by C. B. Stowe, Stowe & Fuller Company, Cleveland, Ohio, for making this mineral synthetically from natural magnesite practically free from iron. Rolling mill scale or iron ore is added to this together with enough water to give it the consistency of mud. This is then molded and baked until it is hard enough to be capable of stacking in a kiln, where it is baked to drive off the carbonic acid gas and water, causing the iron to unite with the magnesia. The temperature employed is between the melting points of Nos. 11 and 19 Seger cones and it is maintained for from 36 to 48 hr. One burning does not complete the process, two and even three being necessary before proper brick result. Before each burning the material is broken up and ground; when crushed it is suitable as grain bulk for linings of open-hearth or electric furnaces after the first baking, according to the claims.

India's Manganese Ore Exports

Manganese ore exports from India for the fiscal year 1915-16 were 472,563 gross tons, against 440,590 tons in the previous fiscal year. The United Kingdom took 380,967 tons, or over 80 per cent, of the last fiscal year's total, against 227,281 tons, or 51 per cent of the previous year's total. The exports to the former principal customers, the United States and France, were reduced 26,103 tons and 26,326 tons to 47,400 tons and 20,000 tons respectively. These data are from the Review of the Trade of India in 1915-16 by the Director of Statistics.

The new open-hearth steel plant of the Ashland Iron & Mining Company, Ashland, Ky., has begun operations. The first day's run was of 48 tons. Delays in receiving equipment and material mean that some time will elapse before rolling operations begin.

BRITISH STEEL INDUSTRY

Plant Expansion and Electric Steel—Greater Latitude in Sulphur and Phosphorus

Reviewing the British steel industry for 1916, the *London Times* emphasizes the following important phases, laying stress on the new plant extensions and equipment in the following:

Some of the new works which have been put in operation recently will challenge comparison with the best that the United States or Germany can show. In the reconstruction of existing works the same complete success was not possible, but much was done by the installation of new machinery and the adoption of fresh labor-saving devices to raise output to a higher level. These things are likely to prove of great advantage in future trading. It is already evident that the iron and steel industry has entered a new era, and no doubt the great manufacturing machine which has been created for a special purpose can be applied to ordinary needs.

A technical development concerns the employment of improved methods for casting sound ingots, of which the Hadfield process is an outstanding example. It is stated that by the use of this and other methods which have been recently introduced, not only is the quality of the steel improved, but the percentage of discard from ingots materially reduced.

Progress in Electric Steel

Another subject which attracted a good deal of attention was the gradual adoption in British Steel-making of the electric furnace, which even in Sheffield has found considerable application. It is understood that the number of such furnaces now in operation is about 45, of which 25 are of the Heroult type, while 10 are the Electro-Metals (the Grönwall-Dixon in the United States) furnaces. Others in use are the Stassano, the Snyder, the Rennerfelt and the Stobie.

One of the subjects which excited interest during the past year was the question of specifications for steels made for government requirements. Some authorities, among whom Dr. J. E. Stead figured prominently, urged that greater latitude should be allowed in specifications, particularly with reference to the permitted percentages of phosphorus and sulphur. For certain classes of shell steel it was claimed that output would be increased and the material give equally satisfactory results in service if higher percentages of phosphorus, ranging up to 0.07 or more per cent, were sanctioned. The figure of 0.04 per cent was rigidly insisted upon in the earlier stages of the war, though lately the permissible amount of phosphorus in certain classes of shell steel was increased to 0.06 per cent.

Expansion in Research Work

The institutions associated with the industry have given indications that they are alive to the need for undertaking research work in various directions. The lead is being taken by the Iron and Steel Institute, which, with the object of focusing attention on subjects requiring investigation, has formed five technical committees. The first of these is concerned with ores, fuels and refractories; the second with blast-furnace practice; the third with the manufacture of steel and ferro-alloys and their mechanical treatment; the fourth with iron and steel foundry practice; and the fifth with metallurgy, chemistry and physics. In connection with refractories some progress has already been made, steps having been taken to form a committee drawn from representatives of the Iron and Steel Institute, Institution of Gas Engineers, the Faraday Society and the Ceramic Society.

The Seattle Construction & Dry Dock Company, Seattle, has secured an order for six 7500-ton steel cargo steamships to be constructed for the Cunard Line. All machinery, including motive, auxiliary and cargo, will be built by the Seattle plant. The vessels will be equipped with 2500-hp. engines. Delivery will start April, 1918, and will follow at the rate of one a month.

MIDVALE STEEL REPORT

First Annual Report of the Midvale Steel & Ordnance Company Shows Large Earnings

The first annual report of the Midvale Steel & Ordnance Company gives a comprehensive description of the properties which have been combined in this corporation, which was organized under the laws of Delaware, Oct. 5, 1915. Its subsidiary companies by full stock ownership are Worth Brothers Company, Wilmington Steel Company, Union Coal & Coke Company, Remington Arms Company (of Delaware) and Buena Vista Iron Company, while the subsidiaries by controlling stock ownership are Cambria Steel Company and Midvale Steel Company. Their operations for the three months ended Dec. 31, 1915, resulted in a surplus of \$1,441,886. The report gives the following statement of income of the company and its subsidiaries for the year ended Dec. 31, 1916:

Net earnings from operations.....	\$36,718,818.68
Other income	887,198.82
	<hr/>
Other charges, interest paid, etc.....	37,606,017.50
Midvale Steel & Ordnance Company bond interest.....	188,904.40
Subsidiary companies bond interest.....	1,816,735.57
Guaranteed dividend on Cambria Iron stock (11 months)	269,395.87
	<hr/>
Balance	310,493.34
	<hr/>
Balance	35,020,488.32
Add excess of premiums on stock sold over discount on bonds and organization expenses.....	754,512.66
	<hr/>
Net earnings	35,775,000.98
Deduct reserves for depreciation.....	3,560,276.93
	<hr/>
Surplus for the year 1916.....	\$32,214,724.05

The consolidated balance sheet as of Dec. 31, 1916, is as follows:

<i>Assets</i>	
Cash	\$11,828,915.77
Customers' accounts	14,531,893.51
Advance payments on ores purchased, etc....	6,839,214.75
Bills and loans receivable.....	8,987,383.80
Marketable securities	1,375,821.49
Inventories	33,422,685.93
Investments	649,771.98
Property and plant (including property under 999-year lease from Cambria Iron Company) ..	135,708,932.93
Deferred charges	867,562.58
Insurance fund assets.....	633,250.73
	<hr/>
Total	\$214,845,433.47
<i>Liabilities and Capital</i>	
Vouchers audited and unpaid payrolls.....	\$5,490,405.59
Deposits received on contracts.....	7,902,650.00
Accruals and miscellaneous.....	3,880,035.30
Bills and loans payable.....	330,212.72
Minority interests in subsidiary companies....	4,126,851.49
Guaranteed stock*	8,468,000.00
Bonded and mortgage indebtedness of Midvale and subsidiary companies.....	54,877,000.00
Capital stock issued.....	100,000,000.00
Reserve for depreciation and mine exhaustion.....	8,054,068.55
Reserve for contingencies and miscellaneous...	3,059,599.37
Balance at Dec. 31, 1916.....	\$33,656,610.45
Less special depreciation charged off property and plant account. 15,000,000.00	
	<hr/>
Total	\$214,845,433.47

*Under the 999-year lease referred to, Cambria Steel Company, as a part of the rental thereunder, agrees to pay annually a sum equal to 4 per cent on the par value of the \$8,468,000 stock of Cambria Iron Company.

A great deal of new construction was provided for in 1916, some of which is still in progress. The most important part of these improvements are as follows: Cambria Steel Company, one blast furnace completed and two in course of construction and two additional open-hearth furnaces; Worth Brothers Company, one additional blast furnace, eight additional open-hearth furnaces, one blooming mill, special forge department with 10 furnaces, 5 hydraulic presses, etc.; Midvale Steel Company, a projectile machine shop equipped with about 60 machine tools and auxiliaries, extensions to rolled wheel plant, extension to armor tempering plant, brass forging plant and several additions to machine shops; Wilmington Steel Company (the old Diamond State Steel Company) overhauled in practically every department.

From the accompanying remarks by President William E. Corey the exact facts are learned with regard to the rifle contracts with the British Government. These contracts were entered into under normal

conditions and under circumstances promising large profit. But, owing to the enormous and unexpected demand which suddenly developed for skilled labor, materials and machinery, all calculations were disarranged, with the result that substantially all manufacturers of arms and ammunition were involved in the abnormal conditions thus produced. Further, the Lee-Enfield rifles had not been standardized and difficulties were encountered by all companies which had entered into contracts for their manufacture, resulting in losses which assumed such proportions that in September the Midvale and other companies having similar contracts entered into negotiations respecting the situation with the British Government. The contracts were so modified as to provide that all manufacturing losses should be made good to the Remington Arms Company of Delaware. Additional rifles that may be called for are to be manufactured at cost, plus a profit to the company. Extracts from President Corey's further remarks are as follows:

"The period which has elapsed since the organization of this company has been abnormal from the commercial and operating standpoints. Due, no doubt, principally to the extraordinary demands for steel products by the warring nations of Europe, the prices of all steel commodities, both for export and for domestic consumption, have advanced to high levels. This has enabled your companies to make large profits. On the other hand, the same causes have increased the cost of production, due to higher cost of labor and of supplies which must be purchased in the open market. The subsidiary companies are fortunately situated in this unusual period in owning a large proportion of the raw materials—iron ore, coal and limestone—which are required in the operation of their furnaces and mills.

"The conditions which may confront manufacturing interests in this country on the return of peace in Europe are the subject of much discussion among business men generally. We are hopeful that the vast amount of material wealth which has been transferred to this country during the past two years will be used for the development of domestic resources and for the extension of American trade with the neutral nations of the world. This would tend to stabilize trade conditions. The problem which confronts us, however, is so complex that it is only ordinary prudence to prepare for adverse trade conditions.

"Owing to ownership of raw materials, efficiency of mill operations, and the adherence to a policy of fair dealing, high quality of product and service to customers, our companies will, no doubt, be able to secure a reasonable share of domestic and export business under any conditions which may arise."

Stock Increase of the Barrett Company

Directors of the Barrett Company, at a special meeting last week, voted to increase the authorized amount of preferred stock from \$5,000,000 to \$12,500,000 and the common from \$15,000,000 to \$25,000,000. The present amount of preferred outstanding is \$4,896,800 and of common \$12,089,100. In a letter calling a special meeting of stockholders for March 16 to approve the proposed stock increase, William H. Childs, president of the company, states that the earnings of the last two years have included profits due to war conditions abroad, but that during the same period the market for the company's normal products has expanded greatly and permanent lines have shown remarkable and profitable growth. The directors expect that, regardless of the effect of early or late peace, dividends upon both preferred and common stocks including these new issues will be continued at the rate of 7 per cent per annum. President Childs states that the cash received from the sale of new stock will provide for cash requirements during the next two years.

The use of an air blast to prevent coal scaffolds in pulverized coal bins at the coke ovens is the first prize suggestion awarded to an employee of the Youngstown Sheet & Tube Company. This was included in the awards for December.

ESTABLISHED 1855

THE IRON AGE

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Railroads and the Ore Movement

No matter what sins of omission and commission railroads have committed during the past year, they certainly must be given credit for doing their full share in moving the tremendous tonnage of Lake Superior iron ore which was shipped from the mines in 1916. The season had not advanced far when in the judgment of the keenest observers along the Lakes it was clear that the mines would be able to do their part except in the event of very serious strikes and that the vessel and dock capacity would be ample, but the serious question was whether the railroads would be able to take care of the ore at lower Lake ports. As the weeks and months passed, the railroads did their work splendidly and there was very little congestion at any time. It now develops that also in all-rail shipments, as indicated by the statistics published by the *Iron Trade Review*, the railroads made a remarkable record, having hauled 1,924,268 tons, or nearly 1,000,000 tons more than in any previous year. This unexpectedly large total of all-rail shipments brings the entire movement from the Lake Superior district in 1916 to 66,658,446 tons.

Glancing at the records of various mines, the achievements of a number of them are remarkable, but that of the mighty Hull-Rust on the Mesaba is indeed marvelous, its output having been 7,665,611 tons, compared with 2,294,405 tons in 1915. Even the Stevenson, long in the million-ton class, but in recent years a small producer, has made a much better showing, for it produced 349,960 tons last year compared with only 8585 tons in 1915.

Reports from the Lake Superior region indicate that the present is the busiest winter in many years not only in mining but in stripping and making other preparations for the great movement this year. Although stock piles have been depleted to a large extent, it will probably be possible to ship as much ore this year as was shipped last year so far as the mines are concerned, with the proviso, which must always be kept in mind, that labor troubles do not become serious. There will also be plenty of vessel and dock capacity, but again this year there will be doubt as to what the railroads can accomplish and this uncertainty is accentuated by the very poor performance of railroads during the past few months.

The Steel Corporation's Brief

Although the decision of the United States Circuit Court in the Steel Corporation dissolution suit was a victory for the defendant for the reason that the court failed to sustain the allegations made by the Government and the judges united in a decree dismissing the petition, the brief which has just been filed by the corporation in the Supreme Court of the United States shows very clearly that the attorneys hope for a more decisive victory in the final decision. In the very able review of the case which they have submitted, the attorneys aim to show that some of the conclusions advanced by Judge Woolley, which he expressed in the opinion filed for himself and Judge Hunt in the Circuit Court, were not well founded. In the belief of the corporation attorneys, Judge Woolley was unduly impressed by the claim of the Government that the formation of the companies afterward acquired by the Steel Corporation was the cause of the increase in prices in 1898 and 1899, and the brief points out that this apparently was one of his principal reasons for holding that they were monopolies and were acquired by the Steel Corporation to reap the benefit supposed to flow from monopoly. The brief quotes from testimony of numerous witnesses to show that Judge Woolley's opinion on this subject was not justified.

As to various points in the testimony, an effort is made to show that Judge Woolley was in error in regard to the Gary committee meetings and the attorneys deny that the meetings raised or maintained prices "as mistakenly stated by Judge Woolley, or that they attempted so to do." In regard to the efforts of the Steel Corporation to steady the market, the brief asserts that Judge Woolley misapprehended the defendant's position when he stated that its assumption of credit in preventing extreme fluctuations was somewhat of an admission that it with others controlled prices by artificial means.

The country will await with interest the decision of the Supreme Court in this case not only as to the main points involved but also as to the methods of reaching conclusions. If the counsel succeed in so clarifying the case that the judges will be able not only to reach a unanimous decision but also to agree upon all the reasons for reaching that decision, it will indeed be a great victory for the corporation

and do much toward permanently settling all of the highly important questions involved.

Last Year's Great Pig-Iron Output

Details of the wonderful record of pig-iron production for 1916 are given in the special statistical bulletin of the American Iron and Steel Institute which has just been issued. The year 1914 recorded the smallest production since 1908 and 1913 remained the banner year until 1916. The figures for the past four years are as follows:

Pig-Iron Production by Merchant Interests and by Consuming Interests—Gross Tons

	For Sale	For Consumption	Total
1913.....	9,523,885	21,442,267	30,966,152
1914.....	7,362,980	15,969,264	23,332,244
1915.....	8,583,007	21,333,206	29,916,213
1916.....	11,253,317	28,181,489	39,434,797

The percentage of merchant iron was 30.8 in 1913; 31.6 in 1914; 28.7 in 1915 and 28.5 in 1916.

The production of spiegeleisen and ferromanganese in 1915 was 226,957 tons while in 1916 it was increased to 415,534 tons owing to the strong pressure due to the inability to obtain the supplies of former years from foreign countries. The statistics of molten iron delivered to steel plants show that the progressive increase in direct metal used has continued with the exception of a slight decline in the case of basic in 1914 and of Bessemer in 1916. The tonnage and the percentages of the total output of Bessemer and basic used direct were as follows:

	Bessemer		Basic	
	Gross Tons	Per Cent	Gross Tons	Per Cent
1913.....	7,823,317	67.5	8,915,179	71.1
1914.....	5,465,565	69.7	6,436,043	66.7
1915.....	7,458,822	70.7	9,648,769	73.8
1916.....	9,833,863	68.2	13,248,510	74.9

Foundry iron constituted a smaller proportion of the total pig-iron output of 1916 than was ever before the case, only 14.1 per cent of the 1916 production being of that grade. In 1900-1-2, the proportion of foundry iron produced averaged 22.7 per cent of the total. The steel industry was hardly an infant at that time, but steel has since gone farther in supplanting the gray-iron casting or at any rate it has retarded expansion in that direction. According to the statistics of the production of malleable iron, the malleable-iron casting industry has grown more rapidly than the steel industry and much more rapidly than the gray-iron casting industry, for 15 years ago only 1.6 per cent of the pig-iron production was designated as malleable iron, while in 1916 the proportion was 2.3 per cent. To put the comparison in more striking form, in 1900-1-2 15 tons of foundry iron was produced to one ton of malleable, while in 1916 the proportion was six to one. It is possible, of course, that even 15 years ago the practice of using standard Bessemer for malleable castings still had considerable vogue.

Still more remarkable than the smallness of the proportion of foundry pig iron produced in the year 1916 as a whole was the fact that the production in the second half of the year was much smaller than in the first half. The proportions were as follows:

	First Half	Second Half
Total production, tons.....	19,619,522	19,815,275
Foundry-iron production, tons	3,086,410	2,467,234
Percentage of foundry.....	15.7	12.4

In 1912-13-14 the proportion of foundry iron produced was 17.6 per cent. If the same proportion

had obtained in the second half of last year the production of foundry pig iron would have increased more than a million tons, or have been more than 41 per cent greater than it was.

These facts have an interesting bearing upon the pig-iron market situation of the past few weeks, for in practically all districts that produce both basic and foundry iron the latter has commended a much higher price than the former, although in the past the two grades have sold at substantially the same price. It would appear that the merchant furnaces overshot the mark. Expecting a shortage of basic iron, they have made so much that it is foundry iron that is the scarcer article. How long it will take for the situation to right itself, for the two grades to equalize in price, is a very interesting question, and a highly important one for consumers who wish to cover second-half requirements.

The 1916 pig-iron statistics present many other interesting points. For years the Bessemer steel industry, reasonably enough, has been regarded as decadent. The maximum production of Bessemer steel ingots and castings occurred in 1906, with 12,275,830 tons. While from 1906 to 1915 the total production of steel increased 37 per cent, the largest production of Bessemer steel after 1907 was 16 per cent less than the production in 1906, other years falling still farther behind.

Now, however, there is the startling fact that the production of Bessemer pig iron in 1916 was 4 per cent larger than the output in 1906, hitherto the record year, and amounted to no less than 14,422,457 tons. Where this large tonnage of Bessemer iron went will not be known until the steel production figures for 1916 are gathered; how much of the extra Bessemer iron was used in Bessemer steel making, and how much was used in the acid open-hearth process, any iron not thus accounted for being attributable presumably to the export trade.

If there was much wrought iron made in 1916 it was not made by puddling pig iron, as the output of gray forge was only 348,344 tons, which, barring the output in 1915 and 1913, is the smallest output for many decades, and only 42 per cent of the output in 1902, the year of largest production in recent times.

The production of merchant iron in the past two years has been as follows, in gross tons:

	1915	1916
Bessemer	871,730	1,976,863
Basic	1,747,265	2,476,677
Foundry	4,801,711	5,473,196
Malleable	829,921	921,486
Forge	174,355	144,615
All other	158,025	260,480
Total	8,583,007	11,253,317

The production of merchant Bessemer iron more than doubled, the increase being due largely, of course, to export demand.

In the production of pig iron by states, the state of Pennsylvania has shown that in the year of tremendous production it comes pretty near to holding its own in spite of the greatly increased activity in some other states. In 1915 as compared with 1914 Pennsylvania increased its percentage by 31.41 and in 1916 its percentage of increase was 29.05 over 1915. Ohio did not make as good a showing last year, for its increase over 1915 was only 24.45 per

cent, compared with an increase of 30.84 per cent in 1915 over 1914. The 1916 increase of Illinois was 60.28, compared with 32.46 in 1915, while the states of Wisconsin and Minnesota combined recorded an increase of 117.53 per cent in 1916, compared with 13.18 per cent in 1915. Alabama increased its output 34.81 per cent in 1916, while its increase in 1915 was only 12.18 per cent. The entire country's per cent of increase for 1916 was 31.82, while for 1915 it was 28.22.

It is too early to make any definite predictions as to what can be accomplished this year, but it seems certain that unless the railroad conditions show a decided change for the better at an early day, it will be extremely difficult for 1917 to equal the record of 1916.

Another Call to Duty

Rarely has the advertising page adopted the power of editorial comment with such telling effect as in the case of the Youngstown Sheet & Tube Company in its advertisement in THE IRON AGE of Feb. 22. Under the caption "The Call to Duty," it emphasized how manufacturers rallied to the support of the Government in the recent crisis in foreign relations. Its eloquent and noble appeal to patriotism cannot be denied.

It pointed out, moreover, that those who direct our great industries are in their high places because they have proved their titles to the jobs by being worthy of them. We are glad to quote the following paragraphs:

In the voluntary enlistment of our great industries for national defense, before even the people themselves have been heard from, may be found a lesson for those who have been unwilling to concede to corporations the civic virtues they claim for themselves. These large aggregations of capital, necessary to efficiently carry on the business of the country, have demonstrated that they are owned and directed by men who represent the highest type of citizenship, are animated by the deepest concern for the national welfare, and are willing to make for that end sacrifices that represent the supreme limit of patriotic devotion.

It is not unreasonable to hope that out of the universal manifestation of these virtues brought about by the present situation may come a better understanding among all our people, rich and poor, employer and employed. This would prove some compensation should peace, so ardently desired by all Americans, eventually become impossible.

At the coming conference of the American Federation of Labor at Washington on March 12 labor leaders are to fix the policy the unions will pursue in time of possible national danger. Nothing short of whole-hearted support of the nation will be acceptable. A wonderful opportunity is afforded Mr. Gompers and his associates to adopt measures which will prevent strikes and walkouts, such as threatened the safety of the British nation in the early months of the present war. Short-sighted policies, such as prompt the blind opposition to time study in Government shops and the hold-up of the railroads must be abandoned. They would be even more reprehensible in time of war than in time of peace.

There is no qualification to the manufacturers' backing of the Government, for a profit interest in war is prevented by the recent action of the Chamber of Commerce of the United States acting with the War Department with this sole aim. A factory in war-time in the future is worthy only of its hire.

To back the nation, business has gone more than half way. It is up to the labor unions to come forward with equal sincerity. Should this be done an opportunity is open for capital and labor to effect an understanding which will go a long way toward preparing the industries of the country to meet successfully what has come to be called the war after the war.

The Engineering Council

So far as the Engineering Council, announced in last week's issue, is concerned, a committee of twenty, comprising representatives from the four larger national engineering societies, has yet to ratify a proposed plan of working, and the accepted plan must yet be ratified by the boards of direction of these societies before the Council comes into being. The purpose of the organization, as mentioned, is to provide a clearing house for the engineering profession for securing united action upon matters of concern common to engineers and the public.

The engineer is most decidedly trying to exert an influence in public matters. It is some months since another movement of this sort was started, growing out of the associations of the sub-committees on industrial preparedness organized by the Naval Consulting Board. This has not yet come to fruition. It involved an altogether new organization, with merely nominal dues. Its aim was to provide the machinery to secure referenda on subjects of public interest tied to engineering. Another simultaneous movement, emphasizing particularly the human relations among engineers, has been making progress and a further meeting for this co-operative movement is shortly to be held. The Engineering Council, aiming at substantially the same thing apparently as the other, or the civic scientific society, seeks to avoid the organization of a new association independent of existing societies.

Constituted of representatives of national societies, it would seem that the Engineering Council must consider merely matters of national interest. This leaves local matters, and properly, to local engineering associations. With the growth of a consolidation of interests of all branches of engineering in a geographical center, the local influence of engineering thought is taken care of; and there is no gainsaying that co-operation of clubs, chapters, sections and branches, whatever they may be called, is the order of the day. Influence on public opinion will surely follow, but only as the association does a public service.

Proposed Mosquito Cargo Fleet

If we were in a state of war, the proposal advanced elsewhere in this issue to circumvent the German submarines by means of a mosquito fleet of small cargo boats would probably not be discussed in the open. Then pressure would be brought to bear to secure government espousal of some such scheme and publicity would be undesirable. National interest at this writing must put the commercial advantage foremost. There is apparently no government machinery for pushing a project of such large proportions, but so general has been the approval in industrial, naval and un-

official Governmental circles that fruition of the plan would seem to depend largely on creating a broad, favorable sentiment. A continuous procession of freight-carrying submarine dodgers across the ocean and back again would promise attractive returns on the investment as long as the war lasts, but the uncertainty of the latter factor, looking at it solely from a business standpoint, might be a deterrent to private enterprise. Pending a British Government decision, it is not clear what will be done, though with a change in our own war status, it is not unlikely the United States Shipping Board might see fit to apply its ship-purchasing funds to participating in this venture.

The High-Grade Ferrosilicon Situation

Despite the fact that imports of ferrosilicon have been large in the past three years, the supply is not adequate and the price is constantly advancing. The imports recently have been as follows:

Period	Gross Tons
October, 1916.....	615
November, 1916.....	761
December, 1916.....	292
January, 1917.....	891
Calendar year, 1914.....	6,146
Calendar year, 1915.....	5,226
Calendar year, 1916.....	6,739

According to these figures the 1916 imports were at the rate of 561 tons per month, while the import rate for the four months, October to January, inclusive, was 639 tons per month. Most of this has come from Canada, where one plant is producing over 100 tons per day.

The situation has been aggravated by two factors. Despite larger production in the United States and fairly regular imports, the consumption has probably increased 50 to 75 per cent over the period before the war. This is due not only to larger steel output but to the fact that steel for shells requires a higher silicon content than ordinarily. The second factor in the strained situation is the difficulty in getting electrodes. So great has become the demand for these because of the rapid increase in installations of electric steel and other furnaces in this country and Canada, that producers are hard pressed to supply enough. Added to this is the power situation at Niagara, which has interfered, at times seriously, with the output of one large electrode maker. Ferrosilicon, 50 per cent, which before the war sold around \$70 per ton, is now commanding \$200 to \$250, with the supply limited.

The consumption at present in the United States is estimated at from 40,000 to 45,000 tons per year. No figures are available as to the production in the United States, but with annual imports only about 6500 to 7000 tons, the needs to be met by the three domestic producers are large and increasing.

British Manganese Ore Imports Low

Manganese ore imports into Great Britain in January, 1917, were 32,047 gross tons against 19,905 tons in December, 1916, and 32,111 tons in January, 1916. The January imports were under the monthly average for 1916, which was 36,625 tons per month, itself a low figure.

The Naval Consulting Board at a recent meeting voted to notify the Secretary of the Navy that the "Board holds itself at the service of the Department of War or of the National Council of Defense, to act as a board of inventions, or in any other capacity which may be of use to the Government in the present emergency."

Edward T. Edwards has acquired the Union Street rolling mill formerly operated by the Susquehanna Iron Company, Columbia, Pa. It is said that machinery formerly in use in a mill in Tennessee will be installed in the plant for initial operations.

New England Iron and Hardware Dinner

Once each year the largest and most representative gathering of New England steel, iron, metal and hardware men takes place at the dinner of the New England Iron and Hardware Association. It was held Feb. 27 at the Hotel Somerset, Boston, and the atmosphere was distinctly patriotic. The room was lavishly decorated with flags and bunting, and the favors were small silk flags. At the conclusion of the dinner, musicians, attired to represent the famous Revolutionary trio, made up of drummers and a fifer, marched about the hall, and were followed in procession by the banqueters.

At the head table were President Charles A. Adams, Leslie M. Shaw, ex-Secretary of the Treasury; Henry G. Wells, president of the Massachusetts Senate; Rev. R. Perry Bush, Samuel L. Powers, toastmaster, and Charles F. Bragg. Members and guests to the number of 250 were seated about 24 tables. President Adams made a brief speech, and introduced Mr. Powers, who has been the toastmaster at most of the 24 dinners that the association has held—a mark of appreciation of his unusual ability in this capacity. Mr. Shaw was the chief speaker, and his discussion of national and international affairs was loudly applauded, particularly his illustration of all business as a chair with three legs—capital, labor and good management—not capital and labor alone, as is generally supposed. In part, he said: "When hostilities end our present prosperity will end. The belligerents will need less and produce more. Their factories are not crippled, except in Belgium. Any current gains which our Government does not take from us we had better conserve to have a reasonable balance against the coming of peace."

Henry G. Wells, introduced by the toastmaster as a probable next Governor, sounded a warning to business men, saying they need to pay more attention to the political drift toward paternalism and legislation that destroy initiative.

Rev. R. Perry Bush delivered a speech with patriotism as its leading thought, speaking from the standpoint of a preacher who loved peace so well that he was ready to fight for it.

The committee of arrangements consisted of A. B. Marble, chairman; R. M. Boutwell, Frank A. Marvin, Herbert Field, Charles A. Adams, E. E. Farnham, Wilbur S. Locke, Fred L. Avery, Fred L. Greely, George J. Mulhall, Leon C. Carter and W. B. Ayer. This committee has the assistance of these business houses: John B. Varick Company, Belcher & Loomis Hardware Company; Peter Gray & Sons, N. H. Bragg & Sons, Dana Hardware Company, Dodge, Haley & Co., A. C. Harvey Company, Jones & Laughlin Steel Company, Congdon & Carpenter Company, Frank W. Brigham, Lackawanna Steel Company, Herrick Company, Carnegie Steel Company, Standard Horse Shoe Company and Avery & Saul. The reception committee, Roswell M. Boutwell, chairman, and the association's capable secretary, George J. Mulhall, were as in years past most active in making the occasion a success.

Government Appeals to Manufacturers

Evidence of the activity of the Government in preparing to meet any conditions that may arise if war should be declared is furnished by a letter which has been sent to prominent manufacturers from an official of the Ordnance Department, in which it is set forth that in the event of war a number of civilian supervisors who have had actual experience in handling individual shops, parts of plants and entire plants, and have demonstrated their ability to produce efficiently and rapidly, will be required. Among those who will be needed will be assistant works managers, superintendents and foremen. The opinion is expressed that graduates of technical colleges who have had practical experience should make competent inspectors, although experienced and high-grade artisans who can read drawings accurately, understand specifications and handle a limited amount of correspondence have, it is stated, made very satisfactory inspectors. Manufacturers are requested to recommend men who could competently fill any of the positions described.

RECORD OF 64th CONGRESS

Some Important Enactments, but Much Desirable Legislation Left Undone

WASHINGTON, D. C., March 6, 1917.—The Sixty-fourth Congress expired at noon on Sunday, March 4, with an extraordinary record for things done and left undone. An open filibuster conducted by a handful of Senators not only resulted in the defeat of the measure authorizing the President to arm merchant vessels to resist submarine attack, but prevented the passage of no less than seven of the big annual appropriation bills and insured the calling of an extra session of Congress some time prior to June 1.

Money has been spent with a lavish hand, the total, including the failed appropriation bills, which must be enacted before July 1, probably exceeding by 100 per cent the expenditures of any preceding Congress. Much of the legislation has been of an experimental character, including the creation of a Federal Shipping Board, with an appropriation of nearly \$50,000,000, and a farm loan board with an indefinite appropriation, the allotment of a huge fund for public highways heretofore regarded as within the exclusive jurisdiction of the States, an immigration law with a literacy qualification passed over Presidential veto, a child labor law of doubtful constitutionality, a vocational educational law, an appropriation of \$11,000,000 for a Government armor-plate factory, and another of \$20,000,000 for a nitrate plant.

Among the important measures that failed of enactment, although urged by the President and by many business men of wide experience, were the Webb bill legalizing export combinations, a measure increasing the membership of the Interstate Commerce Commission and authorizing its division into sub-commissions, a bill relating to railroad labor designed in part to correct the situation produced by the enactment last summer of the Adamson bill providing a so-called eight-hour day for certain favored railroad employees, and the Alexander-Fletcher bill limiting the output of the American shipyards in time of war or national emergency to vessels to be used in the American merchant marine. The so-called Stevens price maintenance bill was killed in committee.

The exigencies of the parliamentary situation that confronted the Kitchin revenue bill when that measure reached the Senate on the eve of adjournment resulted in several important changes in the provisions as reported by the Finance Committee. When the bill was taken up on the floor of the Senate, the legislative program of both houses was so congested that the Senate leaders feared the revenue measure might fail and they therefore abandoned all the amendments of the Finance Committee, thus obviating the necessity of returning the bill to the House for concurrence and possibly for reference to a conference committee. The excess profits tax will remain in force indefinitely and the munitions tax until one year after the end of the European war. Agricultural partnerships will go untaxed.

The defeat of the Webb bill legalizing combinations of exporters was due to a combination of circumstances. The friends of the bill are already preparing to make an energetic campaign to secure its passage as soon as possible in the new Congress. It is believed that instead of re-introducing the bill as drafted by the Federal Trade Commission, an advance agreement will be reached between the leaders of the House and Senate Commerce committees upon the text of the measure which will then be offered in the House.

It is difficult to understand why the bill enlarging the Interstate Commerce Commission and providing for its reorganization failed to become a law at the last session. It was passed by the House early in the first session and was practically without opposition. The failure of the measure must be attributed to the fact that its managers delayed pressing it, in the hope of bringing it up with the railroad labor bill, until too late to secure its consideration.

Notwithstanding the fact that the House and Senate committees having charge of the Alexander-Fletcher bill, relating to shipbuilding in American yards in time of war, declared in their reports upon the measure that its provisions were fairly satisfactory alike to American shipbuilders and to the alien owners of several hundred thousand tons of cargo vessels now building in American yards, there was considerable opposition to the bill in both houses. It is understood that the members of the Shipping Board believe that the board has authority to acquire by purchase all ships now building in American yards for foreign account and that an effort will be made to bring them into the American merchant marine by this means.

Agitation for the passage of the Stevens price maintenance bill was kept up throughout the session, but the fact that Chairman Adamson of the House Committee on Interstate Commerce, before which the bill was pending, was personally strongly opposed to the measure, operated to prevent a vote upon the question of reporting the bill to the House. The feeling against indiscriminate price-cutting is so strong among those who compose the membership of the House in the new Congress that it is believed that the Stevens bill will at least be brought to a vote in committee early in the next session.

W. L. C.

Hadfields Permitted to Export Shells

WASHINGTON, D. C., March 6, 1917.—The British Government has withdrawn its refusal to permit Hadfields, Ltd., to furnish large caliber shells to the United States Government, according to a dispatch received at the State Department from United States Ambassador Page, at London. Up to the present, however, no action has been taken by the Navy Department looking to the placing of any orders with the English manufacturers. The contract upon the basis of which an award was originally made to Hadfields, but subsequently canceled upon the refusal of the British Government to grant permission, included both 14 and 16-in. shells. The 14-in. shells have since been ordered from three American concerns, but no award has yet been made of the 16-in. shells. As the latter will not be required for two years or more, the Navy Department is likely to readvertise for them, in which event it is assumed that Hadfields, Ltd., if at that time permitted to do so, will submit another bid in competition with the domestic manufacturers.

W. L. C.

Sale of American to Bethlehem Closed

The sale by the American Iron & Steel Mfg. Company of its Lebanon and Reading plants to the Bethlehem Steel Company was ratified at a special meeting of the stockholders held at Lebanon, Pa., Feb. 27. On March 1 the consummation of the sale was made at the offices of the Girard Trust Company, Philadelphia. All the papers had been prepared and signed in advance, so that the real business of the meeting was the transfer of \$6,660,000 in Bethlehem Steel bonds to the American officials, who receipted for them on behalf of the stockholders, among whom they are to be distributed.

A committee to standardize tractor specifications has been appointed by the Society of Automotive Engineers, composed of H. L. Horning, chairman, Fred Glover, C. M. Eason, E. R. Greer and George T. Strite. Following a canvas of the industry, general specifications will be fixed and a corresponding specification form adopted, to be used by tractor manufacturers in their catalogs. Tractor speed, the size of bolts, nuts and spark plugs, belt widths, etc., will probably be first considered.

The Cambridge Company, Cambridge, near Riverside, N. J., manufacturer of iron and steel bars, has begun the enlargement of its plant; additional property, 100 x 400 ft., has been acquired for proposed extensions. A continuous furnace for the 9 and 14-in. mill is being installed.

MODERN SHOP MANAGEMENT

Of Remington Typewriter Company—Applied to Irregular Operations of Tool Room

The successful application of scientific management to the tool room as well as to the regular comparatively uniform manufacturing operations involved in the production of typewriters was outlined in an address last December before the Cleveland Chamber of Commerce by F. J. Miller, general factory manager of the Remington Typewriter Company. H. L. Gantt, consulting industrial management engineer, New York, has been engaged for several years in welding together the five Remington factories into one centrally controlled industrial organization, and Mr. Miller's observations, as he pointed out, cover the results achieved by reason of the changes. The paper was in part as follows:

"At the opening of hostilities in Europe, we found it advisable to take in outside work, some of which was tool work. We did a good deal of tool work for an automobile factory which at the same time was having similar work done by another well-known concern. Our rate per hour was one-third more than that of this other concern, but the people for whom we did the work said that our work was not only better done, but done at less cost, notwithstanding our higher rate per hour. That we attribute largely to the use of this system in our tool rooms, showing that it can be successfully applied to work which is not regular manufacturing work.

"In our largest factory, the Remington, according to the last report, time study and bonus had been applied to 3607 different jobs. The production of these jobs had been increased an average of 65.5 per cent; the average labor cost had been decreased 19 per cent, and the average wages of the people working on the jobs had been increased 24 per cent. At the same time, we have shortened the hours of labor, and have introduced two rest periods of 10 min. each, one in the morning and one in the afternoon. These rest periods are of great benefit to our employees, and have not resulted in any decrease of production, but rather in an increase.

"We have charged the cost of developing the system to operating expenses as we went along and have written it off. There has been no increase of cost, even when, temporarily, we were obliged to use both the old and the new systems in places.

A Small Swift-Moving Stream of Work

"One of the noticeable effects in our factories has been the changing of what was relatively a large and slow-moving stream of work through the factories, with its inevitable eddies, in which things are sometimes lost sight of, to a small, swift-moving stream. This not only shows plainly in the general appearance of the factories as one walks through them, but it has a very beneficial effect upon our inventories of raw and partially manufactured material.

"Careful study of every job has resulted in some surprising things. Improvements of 100 per cent are not uncommon. There was one group of 12 small automatic screw machines engaged in an operation connected with our type making, which was reduced to five of the same machines; and the work is better done.

"The factory which at first was not included in the group to which the work was to be applied, was thought finally to require an addition, which was expected to cost about \$40,000. We were asked to look into that, and shortly afterward we were given control of the factory. In time the product of that factory was just about doubled, and the addition has not been built.

"As the result of some rather unusual opportunities for forming a judgment, I should say that the factories were formerly well managed, and in fact they are today in the hands of the same men, with few exceptions. The results were by no means obtained by driving or speeding up the men, because a very important element in the success of the plan is that foremen are no longer drivers of their people, but they are teachers and leaders and helpers. The attitude of the men has changed so that they take a genuine interest in their work. If

CONTENTS

Giving Metals a Rust-Proofing Treatment.....	587
Large Track Scale with Plate Fulcrum.....	589
The Maintenance of Factory Equipment.....	590
Catalytic Action of Gases.....	593
An Investigation of Deoxidizers for Steel.....	594
Lock Nut Employing a Roller Device.....	596
Production of Pig Iron in the United States in 1916.....	597
Preparing American Industries for War.....	598
Hernia as an Accident.....	600
Germany's November Pig-Iron Output.....	600
Plan to Beat Submarines.....	601
Railway Steel Spring Earnings.....	601
Objections to Adopting the Metric System.....	601
Submarine Warfare Restricts Exports.....	602
Barb Wire Exports Very Large.....	603
Smaller British Steel Exports.....	603
Lake Superior Iron Ore in 1916.....	603
New Regenerator Checkers.....	604
Book Reviews.....	605
Donner Steel Company's Report.....	606
Technical Journals Consolidate.....	606
Corporation Makes Vigorous Defense.....	607
Magnesiiferite—Artificial Austrian Magnesite.....	608
India's Manganese Ore Exports.....	608
British Steel Industry.....	608
Midvale Steel Report.....	609
Stock Increase of the Barrett Company.....	609
Editorials:	
Railroads and the Ore Movement.....	610
The Steel Corporation's Brief.....	610
Last Year's Great Pig-Iron Output.....	611
Another Call to Duty.....	612
The Engineering Council.....	612
Proposed Mosquito Cargo Fleet.....	612
The High-Grade Ferrosilicon Situation.....	613
British Manganese Ore Exports Low.....	613
New England Iron and Hardware Dinner.....	613
Government Appeals to Manufacturers.....	613
Record of 64th Congress.....	614
Haddfields Permitted to Export Shells.....	614
Sale of American to Bethlehem Closed.....	614
Modern Shop Management.....	615
Small Pig Iron Output.....	616
Jones & Laughlin Ore Lease.....	617
Blast Furnace Notes.....	617
Two Rennerfelt Furnaces Sold.....	617
Iron and Steel Markets.....	618
Empire Steel & Iron Company's Year.....	629
Cincinnati Metal Trades Meeting.....	629
National Founders' Cost-Finding Method.....	629
Employment of Labor in New York.....	629
Iron and Industrial Stocks.....	629
Finished Iron and Steel Prices, Pittsburgh.....	630
Metal Markets.....	631
Taken Over by Alan Wood Iron & Steel Co.....	631
Personal.....	632
Clinton Company Reorganized.....	633
Advances and Strikes.....	633
Obituary.....	634
Merger Proposed with Marlin Arms.....	634
Pittsburgh and Nearby Districts.....	635
American Iron and Steel Institute Meeting.....	635
Dodge Purchase of Steel Pulley Companies.....	635
Chain Prices Advance.....	635
Locomotive Orders.....	635
National Metal Trades Convention.....	635
Machinery Markets and News of the Works.....	636

anything stands in the way of the accomplishment of their tasks, they let us know it and we try to correct it. The result is that we have hundreds of interested inspectors and critics of our administration machine, with the right and the duty to complain when there is any interference with the making of their bonus. The management needs critics and inspectors as well as the men do."

SMALLER PIG-IRON OUTPUT

February Production 2,637,042 Tons

Daily Rate the Lowest Since August, 1915—
Net Gain of Three Stacks

The production of pig iron in February, exclusive of that made with charcoal, was 2,637,042 gross tons, or only 94,180 tons a day as compared with 3,150,938 tons in January, or 101,643 tons a day. The daily rate of production in February was the lowest since August, 1915, when it was 89,666 tons. The inability of the furnaces to secure coke and other raw materials, combined with bad weather, had its effect in reducing the output, a number of furnaces being banked for various periods in the month.

A net gain of three was made in the number of stacks active on March 1, the number being 315, as compared with 312 on Feb. 1. There was, however, a decline in the capacity of the active furnaces based on the performance in February from 101,866 tons on Feb. 1 to 96,874 tons on March 1.

Daily Rate of Production

The daily rate of production of coke and anthracite pig iron by months, from February, 1916, is as follows:

Daily Rate of Pig-Iron Production by Months—Gross Tons			
	Steel Works	Merchant	Total
February, 1916	75,305	31,151	106,456
March	76,274	31,393	107,667
April	77,226	30,366	107,592
May	77,706	30,716	108,422
June	76,526	30,527	107,053
July	74,397	29,620	104,017
August	74,617	28,729	103,346
September	76,990	29,755	106,745
October	81,639	31,550	113,189
November	80,141	30,253	110,394
December	74,264	28,273	102,537
January, 1917	72,394	29,249	101,643
February	65,244	28,936	94,180

Capacity in Blast March 1 and February 1

The following table shows the daily capacity in gross tons of furnaces in blast March 1 and Feb. 1 by districts:

Coke and Anthracite Furnaces in Blast					
Location of furnaces	Total number of stacks	Mar. 1 Number in blast	Mar. 1 Capacity per day	Feb. 1 Number in blast	Feb. 1 Capacity per day
New York:					
Buffalo	19	14	4,111	14	4,430
Other New York	5	3	559	2	426
New Jersey:					
Lehigh Valley	21	13	3,651	13	3,312
Spiegel	2	2	196	2	204
Schuylkill Val.	12	10	2,610	10	2,953
Lower Susquehanna					
Lebanon Valley	7	5	1,245	5	1,439
Ferro and					
Spiegel	3	3	156	3	161
Pitts. District	53	46	20,706	42	20,633
Ferro and					
Spiegel	3	3	405	3	502
Shenango Val.	19	17	5,083	18	5,574
Western Pennsylvania					
Ferro and					
Spiegel	3	2	152	1	138
Maryland	3	3	971	3	1,169
Ferro	1	1	109	1	99
Ohio:					
Wheeling Dist.	14	12	3,968	12	4,000
Mahoning Val.					
Central and Northern	25	24	9,248	24	10,157
Hocking Val.					
Central and Northern	26	21	6,876	21	7,817
Illinois and Ind.					
Hanging Rk.	15	12	1,315	13	1,650
Michigan, Wis. & Minn.					
Illinois and Ind.	35	30	14,098	32	15,425
Colorado & Missouri					
Ferro	2	1	78	2	127
The South:					
Virginia	18	8	1,072	8	1,095
Kentucky	5	4	572	4	596
Alabama	38	31	7,991	31	8,055
Tennessee	15	11	1,154	10	1,113
Total	399	315	96,874	312	101,866

Production of Steel Companies

Returns from all furnaces of the United States Steel Corporation and the various independent steel companies show the following totals of steel-making iron month by month, together with ferromanganese and

spiegeleisen. These last, while stated separately, are also included in the columns of "total production."

Production of Steel Companies—Gross Tons

	—Pig, total production—			Spiegeleisen and ferromanganese		
	1915	1916	1917	1915	1916	1917
Jan.	1,115,944	2,251,035	2,244,203	18,041	24,866	38,792
Feb.	1,237,380	2,183,845	1,826,846	13,319	23,877	32,187
Mar.	1,551,082	2,365,116		12,274	29,388	
Apr.	1,584,111	2,316,768		12,337	31,862	
May	1,694,290	2,408,890		13,440	35,844	
June	1,770,657	2,295,784		19,200	38,597	
July	1,949,750	2,306,303		17,854	31,353	
Aug.	2,101,818	2,313,122		27,463	33,338	
Sept.	2,129,322	2,309,710		23,159	29,451	
Oct.	2,281,456	2,530,806		23,992	34,566	
Nov.	2,198,459	2,404,210		28,741	44,975	
Dec.	2,283,047	2,294,620		25,004	43,470	

Output by Districts

The accompanying table gives the production of all coke and anthracite furnaces in February and the three months preceding:

Monthly Pig-Iron Production—Gross Tons				
	Nov. (30 days)	Dec. (31 days)	Jan. (31 days)	Feb. (28 days)
New York	183,906	154,496	159,887	135,646
New Jersey	6,384	6,610	6,347	5,765
Lehigh Valley	121,948	113,863	117,823	106,371
Schuylkill Valley	90,119	69,543	76,338	73,081
Lower Susquehanna and Lebanon Valley	78,079	73,835	74,627	62,350
Pittsburgh district	723,997	681,133	655,204	521,572
Shenango Valley	183,273	186,378	179,356	146,323
Western Pennsylvania, Maryland, Virginia and Kentucky	181,409	178,603	187,302	159,774
Wheeling district	89,100	83,850	92,332	75,235
Mahoning Valley	140,245	135,102	124,505	109,236
Central and Northern Ohio	318,181	302,475	300,562	274,941
Hocking Valley and Hanging Rock	258,609	241,935	242,342	179,395
Chicago district	50,966	45,819	47,948	36,894
Mich., Minn., Mo., Wis. and Col.	489,158	503,309	475,803	389,557
Alabama	127,873	128,293	126,352	107,257
Tennessee	234,095	238,558	249,694	222,246
Total	3,311,811	3,178,651	3,150,938	2,637,042

The furnaces blown in between Feb. 1 and March 1 include one Niagara in the Buffalo district, Standish in New York, one Carrie, one Clairton, two Edgar Thomson, one Duquesne and one Isabella in the Pittsburgh district, Covington in Virginia, Dover in Ohio, one Pueblo in Colorado, the stack of the Mississippi Valley Iron Company in Missouri, one Bessemer in Alabama and Rockdale in Tennessee.

Among the furnaces blown out last month were one stack of the Buffalo Union Furnace Company in the Buffalo district, one Edgar Thomson in the Pittsburgh district, Sharon in the Shenango Valley, Adrian in western Pennsylvania, Buena Vista in Virginia, one Lorain in Ohio, Ironton in the Hanging Rock region and one Joliet, one South Chicago and one Gary in the Chicago district.

The Record of Production

Production of Coke and Anthracite Pig Iron in the United States by Months Since Jan. 1, 1913—Gross Tons

	1913	1914	1915	1916	1917
Jan.	2,795,331	1,885,054	1,601,421	3,185,121	3,150,938
Feb.	2,586,337	1,888,670	1,674,771	3,087,212	2,637,042
Mar.	2,763,563	2,347,867	2,063,834	3,337,691	
Apr.	2,752,761	2,269,655	2,116,494	3,227,768	
May	2,822,217	2,092,686	2,263,470	3,361,073	
June	2,628,565	1,917,783	2,380,827	3,211,588	
July	2,560,646	1,957,645	2,563,420	3,224,513	
Aug.	2,545,763	1,995,261	2,779,647	3,203,713	
Sept.	2,505,927	1,882,577	2,852,561	3,202,366	
Oct.	2,546,261	1,778,186	3,125,491	3,508,849	
Nov.	2,233,123	1,518,316	3,037,308	3,311,811	
Dec.	1,983,607	1,515,752	3,203,322	3,178,651	
Total	30,724,101	23,049,752	29,662,566	39,039,356	

The figures for daily average production, beginning January, 1910, are as follows:

Daily Average Production of Coke and Anthracite Pig Iron in the United States by Months Since Jan. 1, 1910

	1910	1911	1912	1913	1914	1915	1916	1917
Jan.	84,148	56,752	66,384	90,172	60,808	51,659	102,746	101,643
Feb.	85,616	64,090	72,442	92,369	67,453	59,813	106,456	94,180
Mar.	84,459	70,036	77,591	89,147	75,738	66,575	107,667	
Apr.	82,792	68,836	79,181	91,759	75,665	70,550	107,592	
May	77,102	61,079	81,051	91,039	67,506	73,015	108,422	
June	75,516	59,585	81,358	87,619	63,916	79,361	107,053	
July	69,305	57,841	77,738	82,601	63,150	82,691	104,017	
Aug.	67,963	62,150	81,046	82,057	64,363	89,666	103,346	
Sept.	68,476	65,903	82,128	83,531	62,753	95,085	106,745	
Oct.	67,520	67,811	86,722	82,133	57,361	100,822	113,189	
Nov.	63,659	66,648	87,697	74,453	50,611	101,244	110,394	
Dec.	57,349	65,912	89,766	63,987	48,896	103,333	102,537	

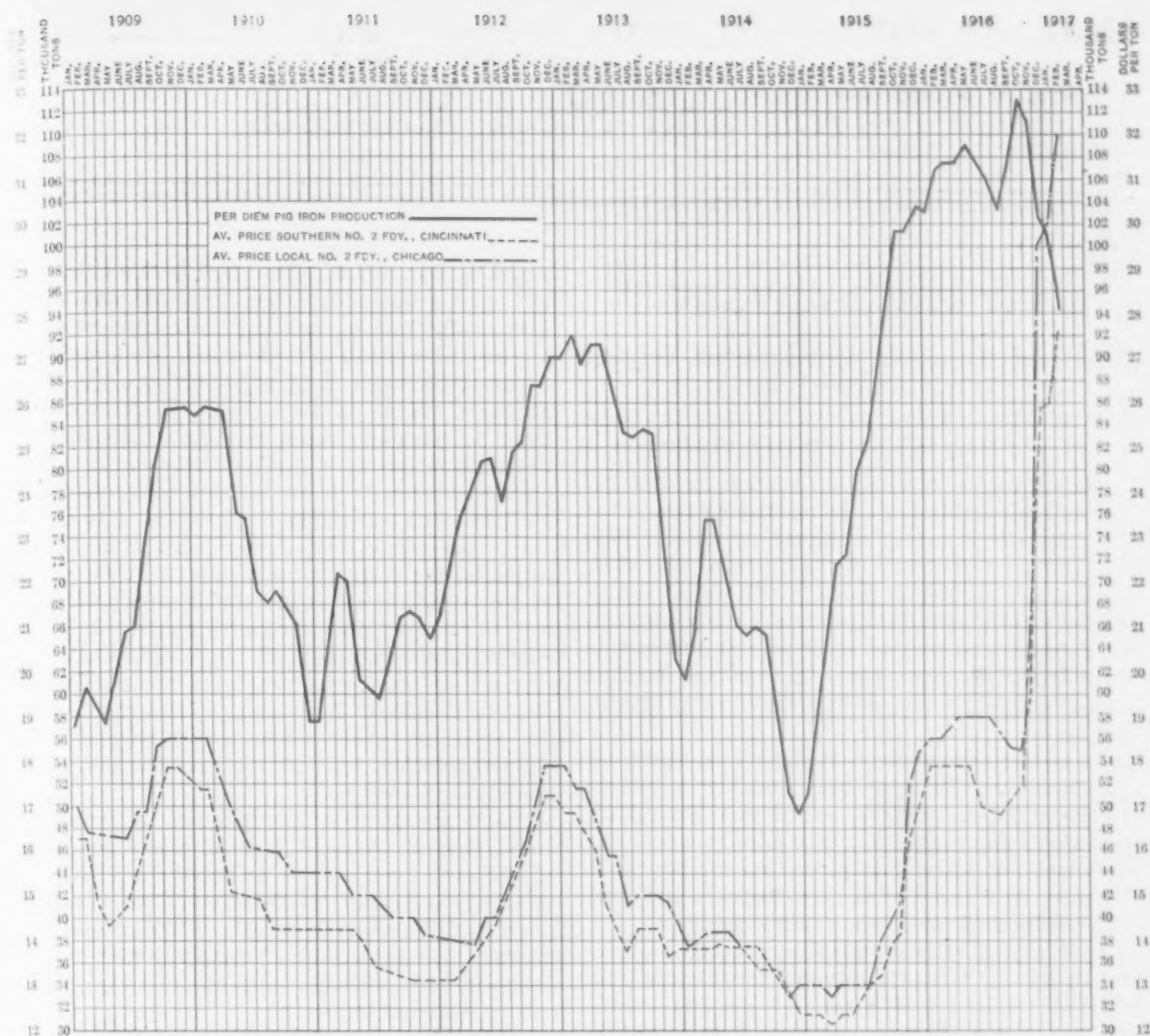


Diagram of Daily Average Production by Months of Coke and Anthracite Pig Iron in the United States from Jan. 1, 1909, to March 1, 1917; Also of Monthly Average Prices of Southern No. 2 Foundry Iron at Cincinnati and Local No. 2 Foundry Iron at Chicago District Furnace

Diagram of Pig-Iron Production and Prices

The fluctuations in pig-iron production from January, 1909, to the present time are shown in the accompanying chart. The figures represented by the heavy lines are those of daily average production by months of coke and anthracite iron. The two other curves on the chart represent monthly average prices of Southern No. 2 foundry pig iron at Cincinnati and of local No. 2 foundry iron at furnace at Chicago. They are based on the weekly market quotations of THE IRON AGE.

Jones & Laughlin Ore Lease

The Jones & Laughlin Steel Company, Pittsburgh, has secured a lease on certain ore mines owned by the Great Northern Ore Properties in northern Minnesota. Under the terms of the lease, the Jones & Laughlin Steel Company agrees to mine a minimum amount of ore per year, the lease to run until the mines are exhausted. The ore requirements of this company are becoming greater, partly due to the building of a new Eliza furnace in the Pittsburgh district, and also to the probability that later on at least two blast furnaces will be added at Aliquippa, Pa., where the company now has four. The ore under lease is in the Mesaba district, but no figures have been given out as to the probable annual production. A similar lease, but for a smaller quantity of ore, has also been taken by the Inland Steel Company, Chicago.

India's production of pig iron in the fiscal year 1915-16 was 250,553 gross tons, comparing with 235,791 tons in the fiscal year 1914-15.

Blast Furnace Notes

The Niagara A stack of the Donner Steel Company was blown in Feb. 6.

In the Shenango Valley the Sharon furnace of the Carnegie Steel Company was blown out on Feb. 15.

Rebecca furnace in western Pennsylvania lost 11 days in February on account of coke and car shortages.

The Buena Vista stack of the Alleghany Ore & Iron Company in Virginia was blown out Feb. 24. This group of furnaces is now entirely out of blast.

The Riverside No. 2 stack of the National Tube Company in the Wheeling district was idle for five days while repairs were being made.

The No. 5 Lorain furnace of the National Tube Company in Ohio was the only one of that group in blast for the entire month. The No. 4 stack was out for the whole month, and the other three were banked for periods ranging from 19 to 23 days.

The B stack of the Federal Furnace Company was banked on Feb. 15, but resumed operations Feb. 28.

Only two furnaces of the Tennessee Coal, Iron & Railroad Company are out of blast, the No. 2 Bessemer stack having been blown in Feb. 7.

Two Rennerfelt Furnaces Sold

Hamilton & Hansell, 17 Battery Place, New York City, have sold two 1-ton Rennerfelt electric furnaces, 300 kw. each, to the Chicago Bearing Metal Company, Chicago, Ill. They are to be used for melting bearing metal.

Iron and Steel Markets

MANY PRICE ADVANCES

Effect of Expected Government Buying

Also of Curtailed Output and Insufficient Capacity—Big Drop in February Iron Production

Belief in early Government purchasing on a war footing scale seems to be the underlying reason for the sharp advances and continued strength of both iron and steel markets. Facing the possible Government pre-emption of space in mills, after suffering the curtailment of output, particularly throughout February, amounting to perhaps 30 per cent as an estimated average, both pig iron and finished steel are sensitive to even expected buying of consumers.

In all this any check due to diminished exporting is discounted. In some lines inability to supply on export orders serves to reduce unwelcome high pressure on mill operations. Big sales have not been the order, but interest in protection for late 1917 and early 1918 needs, with blast furnaces and steel mills well booked for much of these periods.

Spot buying of iron has taken a second place to contracting for late this year and for the first half of 1918. Prices are in a state of ebullition, with Southern iron quotations most difficult to establish, sales occurring with a range as high as \$7 per ton and with substantially no difference between spot and forward business. Resales are responsible for some of the price irregularities. The Alabama irons are clearly rising to a parity with Northern irons. Sales have been made of No. 2 foundry at \$28, Birmingham. Virginia foundry iron has brought \$31 at furnace for the first half of 1918. Bessemer iron is fully \$1 per ton higher.

How serious has been the coke shortage is indicated in the pig-iron production figures for February, which give the month's output at 2,637,042 tons, or a daily production of 94,180 tons, the lowest since August, 1915, when the average daily output was 89,666. For September, 1915, the output was 95,085 tons per day. The February output compares with 101,643 tons per day in January, or over a 7 per cent drop. Three more furnaces were in blast on March 1, 315 in all, than on Feb. 1, but the rate at which they were making iron was 96,874 tons a day against 101,866 tons on Feb. 1.

A rapid recovery may undoubtedly be looked for, as coke production is better and railroad transportation is improved. This fact is shown in easier prompt coke prices, Pittsburgh sales being \$10 against \$12 last week.

Wire and wire products and iron and steel pipe are \$4 per ton higher; light rails have been advanced \$5; last week's rise of \$5 per ton in bar iron is more general; some ferroalloys are \$2 and \$3 per ton higher; some grades of scrap material are com-

manding 50c. and \$1 above last week's quotations, and several plate mills are asking 5.50c. on ordinary tank quality and 7c. on ship plates, these representing advances of \$10 to \$20 per ton. As a prelude to a probable advance in its prices of bars, shapes and plates, which are of course generally understood to cover deferred shipments, mostly in 1918, the Steel Corporation has withdrawn quotations. It appears that the late buying of agricultural bars covers shipment to a large extent in the first half of 1918.

The advance in wire brings wire nails, for example, to the high level of January, February and March, 1900. The rise in wrought pipe applies not only to line pipe and oil-country goods, which have long been in strong demand, but it covers butt-weld pipe which has also advanced out of consideration of costs, in spite of the country's large capacity and the relatively early deliveries obtainable. The higher quotations for light rails are also charged to semi-finished steel costs.

Semi-finished steel affords the one negative feature. Several thousand tons of billets have been offered at \$60 per ton, or \$5 below the Pittsburgh quotation, and resales of Bessemer billets have been made at this price for export. Wire rods, on the contrary, are strong out of sympathy with the advances in wire products. Small lots of high-carbon rods have sold at \$125 per ton.

The week's big sales have occurred chiefly in export business. For France 10,000 tons of rails have been placed, leaving 50,000 to 100,000 tons under negotiation. Some 14,000 cars also for France have been bought. Japan has paid 6.50c., Pittsburgh basis, for 10,000 tons of ship plates. Export inquiries for iron easily total 40,000 tons, all Bessemer, and a fresh inquiry for 20,000 to 40,000 tons of shell bars for the last half has come from France. The United States naval program will take all of 200,000 tons for 1917, exclusive of armor plate.

Pittsburgh

PITTSBURGH, PA., March 6, 1917.

While heavy advances in prices on some lines of finished steel have been made, the whole market is stronger with every indication of prices going still higher. Steel companies report more disposition by consumers to contract ahead, mostly for last half of this year, and at full ruling prices. During the week black and galvanized iron and steel pipe, line pipe, oil-country goods and wire products were advanced \$4 per ton; Bessemer pig iron is up fully \$1 per ton; some ferroalloys are \$2 to \$3 per ton higher, light steel rails, \$5, refined iron bars, \$5, and some grades of scrap 50c. to \$1. The only decline was in prompt blast-furnace coke, which is off about \$2 per ton, because of a larger output and a much better supply of cars. The steel situation has turned largely upon the needs of our own Government, which promise to be very heavy. The home demand for iron and steel products is so large and so unsatisfied that the trade is not going to be seriously affected by the cutting down of some of our exports through inability to get cars and bottoms. There is a shortage in supply in nearly all grades of

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

For Early Delivery

Pig Iron, Per Gross Ton:	Mar. 7, 1917.	Feb. 28, 1917.	Feb. 7, 1917.	Mar. 8, 1916.
No. 2 X, Philadelphia...	\$34.75	\$33.00	\$31.00	\$20.00
No. 2, Valley furnace...	36.00	35.00	31.00	18.50
No. 2 Southern, Cin'ti...	29.00	28.90	26.90	17.90
No. 2, Birmingham, Ala...	27.00	28.00	24.00	15.00
No. 2, furnace, Chicago*	34.00	33.00	30.00	18.50
Basic, del'd eastern Pa...	30.50	30.50	30.50	19.50
Basic, Valley furnace...	30.00	30.00	30.00	18.25
Bessemer, Pittsburgh...	36.95	35.95	35.95	21.45
Malleable Bess., Ch'go*	34.00	33.00	31.00	19.50
Gray forge, Pittsburgh...	31.95	31.95	29.95	18.45
L. S. charcoal, Chicago...	35.75	35.75	33.75	19.75

Rails, Billets, etc., Per Gross Ton:	Mar. 7, 1917.	Feb. 28, 1917.	Feb. 7, 1917.	Mar. 8, 1916.
Bess. rails, heavy, at mill	38.00	38.00	38.00	28.00
O.-h. rails, heavy, at mill	40.00	40.00	40.00	30.00
Bess. billets, Pittsburgh...	65.00	65.00	65.00	40.00
O.-h. billets, Pittsburgh...	65.00	65.00	65.00	40.00
O.-h. sheet bars, P'gh...	65.00	65.00	65.00	41.00
Forging billets, base, P'gh	90.00	90.00	85.00	60.00
O.-h. billets, Phila.....	65.00	65.00	60.00	50.00
Wire rods, Pittsburgh...	80.00	80.00	75.00	55.00

Finished Iron and Steel,

Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Iron bars, Philadelphia...	3.409	3.409	3.159	2.559
Iron bars, Pittsburgh...	3.50	3.25	3.25	2.35
Iron bars, Chicago.....	3.00	3.00	3.00	2.15
Steel bars, Pittsburgh...	3.25	3.25	3.25	2.50
Steel bars, New York...	3.419	3.419	3.419	2.669
Tank plates, Pittsburgh...	5.00	5.00	4.75	2.75
Tank plates, New York...	5.169	5.169	4.919	3.169
Beams, etc., Pittsburgh...	3.25	3.25	3.25	2.25
Beams, etc., New York...	3.419	3.419	3.419	2.419
Skelp, grooved steel, P'gh	3.50	3.50	3.25	2.20
Skelp, sheared steel, P'gh	3.75	3.75	3.50	2.30
Steel hoops, Pittsburgh...	3.75	3.75	3.25	2.50

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Sheets, Nails and Wire, Per Lb. to Large Buyers:	Mar. 7, 1917.	Feb. 28, 1917.	Feb. 7, 1917.	Mar. 8, 1916.
Sheets, black, No. 28, P'gh	4.75	4.75	4.50	2.75
Sheets, galv., No. 28, P'gh	6.75	6.75	6.25	4.75
Wire nails, Pittsburgh...	3.20	3.00	3.00	2.40
Cut nails, Pittsburgh...	3.70	3.70	3.50	2.30
Fence wire, base, P'gh...	3.15	2.95	2.95	2.25
Barb wire, galv., P'gh...	4.05	3.85	3.85	3.25

Old Material, Per Gross Ton:

Iron rails, Chicago.....	\$27.00	\$27.00	\$27.00	\$18.00
Iron rails, Philadelphia...	28.00	28.00	28.00	19.50
Carwheels, Chicago.....	20.00	18.00	18.50	14.50
Carwheels, Philadelphia...	20.50	20.50	20.50	16.50
Heavy steel scrap, P'gh...	22.00	22.00	22.00	18.00
Heavy steel scrap, Phila...	22.00	22.00	20.00	16.50
Heavy steel scrap, Ch'go...	22.75	22.25	21.25	16.50
No. 1 cast, Pittsburgh...	20.00	20.00	19.00	16.00
No. 1 cast, Philadelphia...	20.00	20.00	20.00	17.00
No. 1 cast, Ch'go (net ton)	16.50	16.00	15.00	13.50
No. 1 RR. wrot, Phila...	29.00	27.00	25.00	21.50
No. 1 RR. wrot, Ch'go (net)	25.00	24.00	23.50	18.00

Coke, Connellsville, Per Net Ton at Oven:

Furnace coke, prompt...	\$10.00	\$12.00	\$9.00	\$3.75
Furnace coke, future...	7.00	7.00	6.00	2.85
Foundry coke, prompt...	12.00	13.00	10.00	3.75
Foundry coke, future...	7.50	7.00	8.00	3.50

Metals,

Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York...	36.25	36.50	33.00	27.00
Electrolytic copper, N. Y.	36.25	36.50	33.00	26.50
Spelter, St. Louis.....	10.62 1/2	10.50	10.00	19.00
Spelter, New York.....	10.87 1/2	10.75	10.25	19.25
Lead, St. Louis.....	9.50	9.62 1/2	8.30	6.70
Lead, New York.....	9.50	9.75	8.50	6.70
Tin, New York.....	54.00	50.50	55.00	49.00
Antimony (Asiatic), N. Y.	30.00	31.00	25.00	44.00
Tin plate, 100-lb. box, P'gh	\$8.00	\$7.50	\$7.00	\$4.00

pig iron, while semi-finished steel has been short for months, and on some lines of finished material the mills are sold up for practically all of this year. If a heavy demand for steel in the form of munitions should set in from the Government, there is no telling how much higher prices would go. Predictions are made that if war is declared with Germany Bessemer and basic iron will go to \$50 or higher, billets and sheet bars might go to \$100 and there would undoubtedly be heavy advances on all kinds of finished steel. The export demand for nearly all steel products is still heavy, but much of it is turned down by the mills, as they cannot possibly take on export orders and also satisfy domestic demands. Buyers are now getting eager to cover for the last half of this year and some into 1918. The supply of cars is better. Some railroad embargoes having been removed, shipments of iron and steel products in the past two weeks were enormously heavy and have done much to relieve the wants of customers who had been suffering badly for material. The heaviest snow in the Pittsburgh district for four years fell on Sunday and Monday and this may again adversely affect the railroad situation, but up to this writing railroads and shippers both report that cars are moving freely. However, the car situation is still very far from being satisfactory and will remain so, to some extent at least, until deliveries have been made to the railroads of new cars and engines that are being turned out as fast as the builders can erect them.

Pig Iron.—The new demand for Bessemer and basic iron is fairly active. With the scant supply of Bessemer, prices have advanced squarely to \$36, Valley furnace, the highest price reached on such iron in many years. One export inquiry is for 20,000 tons of Bessemer for the last half of this year, another for 12,000 tons for Italy, 2000 tons a month for last half; and another for 6000 tons, 1000 tons a month starting in April. Producers of pig iron and dealers say that very little of this iron can be secured in this market, as the furnaces that make Bessemer are sold up for five or six months. An outside consumer is also inquiring for 20,000 tons of Bessemer, and an open-hearth steel plant in the Wheeling district wants 5000 tons, presumably to

make ingot molds in a new foundry which it has recently completed. There is also some inquiry for prompt basic iron, which readily brings \$30, Valley furnace. Sales of No. 2 foundry have been made at \$35 for second-half delivery and it is said that \$37 and even \$38 has been done. The pig-iron market is very strong. A number of furnaces that were banked for lack of coke have again started. W. P. Snyder & Co. report the average price of basic iron in February to have been \$30, the same as in January, and of Bessemer \$35.418, both at Valley furnace, the Bessemer price showing an advance over January of 41.8c. Several small sales of Bessemer iron are reported to have been made in February at above \$35, Valley furnace, which accounts for the average price for the month having been higher than that figure. A sale is reported of 6000 tons of Bessemer for forward delivery on the basis of \$37 at Valley furnace, but this price is not actually confirmed as having been paid. Numerous small sales of Bessemer ranging from 300 tons to possibly 1000 tons have undoubtedly been made at \$36 at furnace, and that price is regarded to-day as minimum of the market. We quote standard Bessemer iron at \$36 to \$37, basic, \$30 to \$31, gray forge \$31 to \$32, No. 2 foundry \$36 to \$38, and malleable Bessemer \$31 to \$32, all at Valley furnace. The freight rate to the Pittsburgh and Cleveland districts is 95c. per ton.

Billets and Sheet Bars.—The various railroad embargoes that existed up to about two weeks ago released a good deal of steel in the form of billets and sheet bars which could not be shipped to certain plants that were embargoed. But this has made no difference whatever in prices, which are as strong as ever. In fact, it is doubtful whether any considerable quantity of billets or sheet bars could be bought to-day at less than \$70 per ton, and reports are that sales have been made at that figure. However, dealers say they are still able to get small quantities of soft billets and sheet bars at \$65 to \$70 at mill. Shipments of billets and sheet bars by the steel mills in the past two weeks were much heavier, due to a better supply of cars. We quote soft Bessemer and open-hearth billets and sheet bars at \$65 to \$70 per ton, maker's mill, Pittsburgh or Youngstown; forging

billets, \$90 to \$95 for sizes up to but not including 10 x 10 in., and for carbons up to 0.25.

Ferroalloys.—There is a fair demand for ferromanganese, both for prompt and forward delivery. Domestic 80 per cent is held at \$275 to \$300 at furnace, most makers asking the higher price. For third-quarter delivery domestic could likely be bought at \$275 and for fourth quarter \$250, but makers will not sell for the third quarter unless an equal quantity is taken for the fourth quarter. Some makers of English ferromanganese have entirely withdrawn their price of \$185, seaboard, for delivery after July 1, but a few are still offering to sell at that price for the last half, with no guarantee as to shipments. The famine in ferrosilicon, both in 50 per cent and lower percentages, is still on and very high prices are being paid for prompt shipment, small lots of 50 per cent having sold at as high as \$250. We quote domestic 80 per cent ferromanganese for prompt shipment at \$275 to \$300 per ton at furnace and English 80 per cent at \$185, seaboard, for last-half delivery. We quote 18 to 22 per cent spiegeleisen at \$65 to \$70, and 25 to 30 per cent at \$75 to \$85, delivered. We quote 9 per cent Bessemer ferrosilicon at \$45 to \$46; 10 per cent, \$46 to \$47; 11 per cent, \$47 to \$48; 12 per cent, \$48 to \$49; 13 per cent, \$49.50 to \$50.50; 14 per cent, \$52; 15 per cent, \$54, and 16 per cent, \$56. We quote 7 per cent silvery iron at \$42 to \$45; 8 per cent, \$43 to \$46; 9 per cent, \$44 to \$47; 10 per cent, \$45 to \$48; 11 and 12 per cent, \$46 to \$49, all f.o.b. at furnace, Jackson or New Straitsville, Ohio, and Ashland, Ky., these furnaces having a uniform freight rate of \$2 per gross ton for delivery in the Pittsburgh district.

Structural Material.—The inquiry is quite active and local fabricating shops are filled with work for many months ahead. The McClintic-Marshall Company has taken 1004 tons of bridge work for the St. Louis & San Francisco Railroad; the American Bridge Company, 479 tons of bridge work for the Wheeling & Lake Erie Railroad, and 300 tons additional for the Masonic Temple at Cleveland, making the total quantity 1200 tons, and the Fort Pitt Bridge Works, 300 tons of bridge work for the Lackawanna. We quote 15-in. beams and channels from 3.25c. to 3.50c., according to quantity and delivery, while small lots from warehouse sell at 4c. to 5c.

Plates.—The demand for ship plates and the pressure on the mills for deliveries are enormously heavy, and promise to continue this way for many months. One mill is credited with having taken about 20,000 tons of ship plates for delivery in the first half of 1918 at close to 6c. at mill, and another about 12,000 tons for same delivery and at about the same price. Reports are that the French Government has placed an order with the Standard Steel Car Company for about 14,000 cars. The order calls for 2300 two-truck cars, each requiring about 10 tons of steel, while each of the others will take about five tons. Last December that government placed an order with the company for 5000 cars. The Florida East Coast Line is in the market for 200 steel flat cars, the Milwaukee Electric Railway for 200 general service cars and the Great Northern for 300 all-steel gondolas. We quote ¼-in. and heavier sheared plates at 3.75c. at mill for indefinite delivery, 4.75c. to 5c. at mill for fairly prompt shipment and 5.25c. to 5.50c. for small lots at mill.

Sheets.—Most large consumers are covered on their needs up to July, and in the case of automobile builders and other similar large users some are covered to the end of this year. The output of sheets in February was cut down possibly 30 per cent or more by shortage in fuel and inability of mills to get cars, thousands of tons of sheets being piled in warehouses until cars could be secured to ship them. The new demand is fairly heavy and prices are fairly firm. There is also a large export demand for sheets, but most of such offered business is being turned down, as the mills cannot possibly make deliveries. We quote blue annealed sheets, Nos. 3 to 8, 4.75c. to 5c.; box annealed, one-pass Bessemer cold-rolled, No. 28, 4.75c. to 5c.; No. 28 galvanized, 6.50c. to 7c.; No. 28 black plate, tin-mill sizes, 4.50c. to 4.75c.;

all f.o.b. mill, Pittsburgh. These prices are for carloads and larger lots, for shipment over the next two or three months. For more prompt delivery higher prices would be asked.

Steel Rails.—Effective Monday, March 5, prices on new light rails rolled from billets were advanced \$5 per ton. This advance had been expected because of the higher costs of steel and of operating, on account of shortage of fuel, etc. The new demand for light rails is reported active, especially from coal-mining interests, many abandoned mines having recently been opened on account of the high prices of coal, and for which many miles of track have been laid. Only small routine orders are being placed for standard sections. We now quote light rails as follows: 25 to 45 lb., \$55; 16 to 20 lb., \$56; 12 and 14 lb., \$57, 8 and 10 lb., \$53, in carload lots, f.o.b. mill, with the usual extras for less than carloads. Standard section rails of Bessemer stock are held at \$38 and open-hearth \$40, per gross ton, Pittsburgh.

Tin Plate.—As noted before, little tin plate remains to be sold for this year, nearly all consumers being covered to the end of 1917, with prices for delivery in the last half to be fixed later. There is a very heavy export demand, and makers say there would be no trouble in getting \$8 per base box if they could spare any and at the same time take care of their domestic trade. It is said that recent inquiries from China, Japan and India aggregate fully 300,000 boxes, very little of which has been placed. The output in February was cut down very much, but the chances are that March production will be large as the situation is better as to cars and fuel. On current orders, prices range from \$7.50 to \$8 per base box at mill, but the lower price has about disappeared, nearly all makers quoting \$8. We quote long terne plate, 28 gage, base, at \$7 to \$7.50; short terne plate, \$11.50 to \$12.50, makers' mill.

Shafting.—Most consumers of shafting are covered to July, and some of the larger users up to the end of this year. The large and most desirable contracts were placed with the makers at 20 per cent off list, and the smaller contracts at 15 per cent off. Prices are now very firm, and it is intimated that 20 per cent discount will soon be withdrawn. Specifications against contracts are heavy, but some makers, owing to increased capacity, can promise deliveries in 10 to 12 weeks from date of order. We quote cold-rolled shafting at 20 to 15 per cent off in carload lots and 10 per cent off in less than carload lots for first quarter and first half, f.o.b. Pittsburgh, freight added to point of delivery.

Railroad Spikes and Track Bolts.—Makers report the new demand quite active. Two local plants have their output sold up for five or six months. It develops that the New York Central inquiry for 20,000 to 25,000 kegs of spikes has not yet been placed, several makers declining to quote on account of deliveries running so far ahead. Two fairly large inquiries for spikes are in the market from Canada. Prices are very firm and there is some talk of an advance in the near future. We quote track bolts with square nuts at 4.85c. to 5c. to railroads and 5c. to 5.25c. in small lots to jobbers, base. Railroad spikes, 9/16 in. and larger, \$3.40, base; 7/16 and ½ in., \$3.50, base; 5/16 and ¾ in., \$3.75, base. Boat spikes, \$3.65, base, all per 100 lb., f.o.b. Pittsburgh.

Wire Products.—As intimated in this report last week, prices on wire products have been advanced \$4 per ton, effective from Monday, March 5. The demand has been about normally heavy for a long time, makers are sold up for three months or more, and costs have been steadily increasing, so that makers feel that the advance is fully justified. The export demand is also heavy, especially for barb wire for shipment to Italy and France. It is said that lately 100,000 tons or more have been placed with domestic mills for shipment to those countries in the last half of this year. Prices now in effect are as follows: Wire nails, \$3.20 base per keg; galvanized, 1 in. and longer, including large-head barb roofing nails, taking an advance over this price of \$2.20, and shorter than 1 in. \$2.70. Bright basic wire is \$3.25 per 100 lb.; annealed fence wire, Nos. 6 to 9, \$3.15; galvanized wire, \$3.85; galvanized barb wire

and fence staples, \$4.05; painted barb wire, \$3.35; polished fence staples, \$3.35; cement-coated nails, \$3.10, base, these prices being subject to the usual advances for the smaller trade, all f.o.b. Pittsburgh, freight added to point of delivery, terms 60 days net, less 2 per cent off for cash in 10 days. Discounts on woven-wire fencing are also lowered two points, effective March 5, and are now 51 per cent off list for carload lots, 50 per cent off for 1000-rod lots, and 49 per cent off for small lots, f.o.b. Pittsburgh.

Wire Rods.—It is not unlikely that the recent advance of \$4 per ton in wire products will have the effect of pulling up prices still higher on rods. In fact, it is claimed that high-carbon rods have sold at \$125 per gross ton at maker's mill, but we have not been able to confirm this. Some time ago high-carbon rods sold at \$110, maker's mill, and the market has advanced considerably since then. The demand for soft rods is still quite heavy, and export inquiries are active, but in most cases are turned down, as makers of rods need their entire output for their own wire mills and for domestic customers. We now quote soft Bessemer, open-hearth and chain rods at \$80 to \$85 per gross ton at maker's mill, while high-carbon rods range from \$90 to \$125, depending on carbons.

Iron and Steel Bars.—Effective Friday, March 2, the Lockhart Iron & Steel Company of this city advanced its price on refined iron bars \$5 per ton, or from 3.25c. to 3.50c. at mill. Implement makers have been active for several weeks contracting for steel bars for delivery in the last half, and it is stated that fully 250,000 tons have been placed, much of this quantity at 3c. at mill. It is said that some of the very largest consumers covered at 2.70c. These are the highest prices paid for steel bars by implement makers in many years. The output of local steel-bar makers is now practically under contract for the entire year, and specifications are reported active. Several steel-bar mills outside this city that have not sold so far ahead are obtaining 3.25c. at mill for delivery in 60 to 90 days from date of contract. We quote steel bars at 3c. at mill for extended delivery, and 3.10c. to 3.25c. for shipment in three to four months; refined iron bars, 3.50c., and railroad test bars, 3.65c., in carload lots at mill.

Nuts and Bolts.—The demand for the past three or four weeks has been abnormally heavy, and makers are sold up for three months or longer. Export demand is also active, and a local concern has recently sold three carloads for shipment to Denmark. It is said that on some export orders fully \$20 per ton advance has been obtained over domestic prices. It is likely that prices will be advanced in the near future. The output in February was cut down very much by shortage of fuel and cars, makers being compelled to pile their production in warehouse until cars could be obtained. Discounts are as follows, delivered in lots of 300 lb. or more, when the actual freight rate does not exceed 20c. per 100 lb., terms 30 days net, or 1 per cent for cash in 10 days:

Carriage bolts, small, rolled thread, 40 and 10 per cent; small, cut thread, 40 and 2½ per cent; large, 30 and 5 per cent.

Machine bolts, h. p. nuts, small, rolled thread, 50 per cent; small, cut thread, 40 and 10 per cent; large, 35 and 5 per cent.

Machine bolts, c. p. c. and t. nuts, small, 40 per cent; large, 30 per cent. Bolt ends, h. p. nuts, 35 and 5 per cent; with c. p. nuts, 30 per cent. Lag screws (cone or gimlet point), 50 per cent.

Nuts h. p. sq. and hex., blank, \$2.50 off list, and tapped, \$2.30 off; nuts, c. p. c. and t. sq., blank, \$2.10 off, and tapped, \$1.90 off; hex., blank, \$2.25 off and tapped \$2 off. Semi-finished hex. nuts, 50, 10 and 5 per cent. Finished and case-hardened nuts, 50, 10 and 5 per cent.

Rivets 7/16 in. in diameter and smaller, 40 and 10 per cent.

Rivets.—The new demand is reported heavy and prices are firm. Export orders recently taken include two carloads for India and one for South Africa. Domestic consumers are specifying very freely against contracts. Makers quote buttonhead structural rivets, ½ in. in diameter and larger, \$4.25 per 100 lb., base, and conehead boiler rivets, same sizes, \$4.35 per 100 lb., base, f.o.b. Pittsburgh. Terms are 30 days net, or one-half of 1 per cent for cash in 10 days.

Hoops and Bands.—The new demand is quite heavy, but most consumers are covered to July and some of the larger users over all of this year. The Carnegie Steel pany is still quoting steel bands at 3c., with extras as per the steel-bar car, and hoops at about 3.75c. at mill, but with no definite promise of delivery. Other makers that are not sold so far ahead are holding steel bands for fairly prompt shipment at 3.25c. and steel hoops from 3.75c. to 4c. at mill.

Cold-Rolled Strip Steel.—The current demand is good, but most consumers are covered to July 1, and specifications against contracts are coming in freely. Prices are stronger and on current orders we quote from \$8 to \$8.50 per 100 lb., depending on the quantity and deliveries wanted. For second-quarter delivery we quote \$7 to \$7.50. Terms are 30 days net, less 2 per cent for cash in 10 days, delivered in quantities of 300 lb. or more when specified for at one time.

Wrought Pipe.—Effective Monday, March 5, discounts on black and galvanized iron and steel pipe, line pipe and oil country goods were lowered two points, equal to an advance of \$4 per ton. This advance, which follows a similar one made Feb. 14, had been expected. It is caused by the pipe mills being well sold up for all of this year on lap-weld and line pipe and for six to eight months on oil-well supplies, while the new demand is very heavy. On large inquiries most of the makers are not quoting, being unable to take more business for delivery until late this year. On butt-weld sizes, the mills are not so well filled, and can ship in 8 to 10 weeks from date of order. Some large inquiries for line pipe for gas and oil projects are in the market, but the best deliveries that are promised on these is September or October, and some mills will not quote for any delivery this year. Shipments of pipe have been better in the past two weeks, the car supply having improved considerably. The new discounts are given on another page.

Boiler Tubes.—Some makers are not quoting, being filled up for all of this year, with much business booked for delivery in 1918. Heavy premiums over regular prices are readily paid for fairly prompt shipment of either iron or steel tubes. Discounts have not been changed for a long time, but any sales of either iron or steel tubes now being made are at considerably higher prices. These nominal discounts are given on another page.

Coke.—The car supply was much better last week, and more coke was moved from the ovens to blast furnaces and foundries than in any one week for a long time. However, the heaviest snow of the winter fell on Sunday and Monday, and this will likely again retard the movement of cars. Quite a number of blast furnaces in Pittsburgh and in the two valleys that were banked for lack of coke started last week, but some of them may have to bank again this week. The quicker deliveries on coke resulted in easier prices on prompt coke, and it sold late last week as low as \$10 per net ton at oven against \$12 in the previous week. Some fairly large contracts for 72-hr. foundry coke for delivery in the last half of this year were closed last week at \$7.50 to \$8 per net ton at oven. We now quote best grades of blast-furnace coke for spot shipment at \$10 to \$10.50 per net ton at oven. Producers are asking \$8 or more for furnace coke on contracts, but there is nothing doing. We quote best grades of 72-hr. foundry coke for spot shipment at \$12 to \$13 per net ton at oven. The Connellsville Courier gives the output of coke in the upper and lower Connellsville regions for the week ended Feb. 24 as 353,461 net tons, an increase over the previous week of 46,837 tons. This is the largest increase in any one week for many months.

Old Material.—The better car supply last week permitted a lot of scrap that was loaded on cars to reach consumers, and several plants that were practically embargoed also took in scrap, so that the situation in this respect is showing improvement. However, stocks held by consumers are heavy, and at present they do not seem disposed to buy more. Scrap is bringing higher prices in the valleys than in the Pittsburgh district. There is a moderate demand for borings and

turnings and for low-phosphorus melting scrap. Dealers believe that prices will soon be better if the car situation continues to improve. Some blast furnaces are buying turnings at about \$11.50 per gross ton at furnace. The tone of the entire market is slightly stronger. Prices for delivery in Pittsburgh and at other consuming points that take Pittsburgh freight rates, per gross ton, are as follows:

Heavy steel melting scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen, Midland and Pittsburgh, delivered	\$21.00 to \$22.00
No. 1 foundry cast	20.00 to 20.50
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	27.00 to 28.00
Hydraulic compressed sheet scrap	18.00 to 18.50
Bundled sheet scrap, sides and ends, f.o.b. consumers' mills, Pittsburgh district	15.50 to 16.00
Bundled sheet stamping scrap	15.00 to 15.50
No. 1 railroad malleable stock	19.00 to 19.50
Railroad grate bars	12.50 to 13.00
Low phosphorus melting stock	32.00 to 32.50
Iron car axles	41.00 to 42.00
Steel car axles	45.00 to 46.00
Locomotive axles, steel	48.00 to 49.00
No. 1 bushing scrap	18.50 to 19.00
Machine-shop turnings	11.50 to 11.75
Old carwheels	20.50 to 21.00
Cast-iron borings	11.75 to 12.00
*Sheet bar crop ends	25.00 to 26.00
No. 1 railroad wrought scrap	24.50 to 25.00
Heavy steel axle turnings	15.50 to 16.00
Heavy breakable cast scrap	19.00 to 19.50

*Shipping point.

Chicago

CHICAGO, ILL., March 6, 1917.

As a prelude to a probable advance in its prices for bars, shapes and plates, the leading interest last week withdrew all quotations and for the time being is entertaining practically no inquiry other than for light rails and pig iron. The interval will make possible a casting up of sales against expected production. The activity of implement manufacturers who were not sufficiently covered for the last half finally resulted in the placing of a large amount of bars, some for delivery in the last half of this year but more largely for shipment in the first half of 1918. From the railroads there are a number of inquiries for small lots of rails and the Pennsylvania is reported to have bought 75,000 tons. In the face of a situation growing steadily worse, both as to prices and supply, the inquiry and effort to secure plates persists without cessation. A like condition, though of somewhat less magnitude, exists with respect to sheets. Further advances of \$4 per ton in the price of light rails and of \$4 for wire are announced. The pig-iron market is most largely concerned with the efforts of consumers to solve their immediate difficulties in the way of iron and coke supply and interest in future requirements is, for the time, of secondary importance, though one lot of 3600 tons of malleable iron is about to be placed. Prices of scrap have made an actual advance in a few directions and the tone of the entire market for old material is somewhat firmer.

Pig Iron.—While the buying of pig iron has not been heavy, a fair quantity has been sold by both Northern and Southern interests. The few remaining Southern interests having iron to sell for last half have been still further reduced in number, one interest which, until the end of last week, had been quoting on the basis of \$26 and \$26.50, at Birmingham, having withdrawn. Several thousand tons of Southern iron was sold in the course of the week at \$26, but to-day the largest seller has advanced its price to \$27 and, for the first half of next year, has quoted \$26, at Birmingham. The small lots of Northern iron that have been sold have been uniformly at the price of \$34, which quotation still obtains. The most important inquiry upon which figures are now being taken is one for 3600 tons which is likely to be satisfied either with malleable Bessemer or standard Bessemer iron. The coke situation seems to have passed its most critical point but the scarcity of fuel is still sufficiently serious to put a premium upon cars in transit. The Federal stack which was banked has resumed. For Lake Superior charcoal iron we quote delivery prices at Chicago to include a freight rate of \$1.75. The following quotations are for iron delivered

at consumers' yards, except those for Northern foundry, malleable Bessemer and basic irons, which are f.o.b. furnace, and do not include a switching charge averaging 50c. per ton:

Lake Superior charcoal, Nos. 2 to 5	\$35.75 to \$37.75
Lake Superior charcoal, No. 1	36.75 to 38.75
Lake Superior charcoal, No. 6 and Scotch	36.75 to 39.75
Northern coke foundry, No. 1	34.50 to 35.00
Northern coke foundry, No. 2	34.00 to 34.50
Northern coke foundry, No. 3	33.50 to 34.00
Northern high phosphorus foundry	31.00 to 32.00
Southern coke No. 1 f'dry and 1 soft	30.50 to 31.50
Southern coke No. 2 f'dry and 2 soft	30.00 to 31.00
Malleable Bessemer	34.00 to 34.50
Basic	34.00 to 34.50
Low phosphorus	58.00 to 59.00
Silvery, 8 per cent.	43.50 to 44.50
Bessemer ferrosilicon, 10 per cent.	50.00

Structural Material.—The Pere Marquette Railroad has placed an order for 1000 cars with the Haskell-Barker Company, subject to the approval of the court. Of the contracts placed for steel to be fabricated, the Minneapolis Steel & Machinery Company took 600 tons for an ore bridge for the Calumet & Hecla Mining Company, and 400 tons for the Montana-Utah Sugar Company's plant, while the Lewis-Hall Iron Works, Detroit, took 275 tons for a University of Michigan building and 450 tons for the building of the Saginaw Malleable Iron Company. A contract was also let for 275 tons for a Christian Science church at Chicago. We quote for Chicago delivery of structural steel from mill 3.439c. to 3.689c.

We quote for Chicago delivery of structural steel out of jobbers' stocks, 4c.

Rails and Track Supplies.—The Pennsylvania Railroad is reported to have placed its order for a total of 75,000 tons of rails. Other inquiry is made up of small lots from the lesser railroads in an aggregate amount of about 15,000 tons. Sales of light rails about equal mill capacity, and prices have again been advanced \$4 per ton. Quotations are as follows: Standard railroad spikes, 3.50c. to 3.60c., base; track bolts with square nuts, 4.50c. to 4.60c., base, all in carloads, Chicago; tie-plates, \$55 to \$60, f.o.b. mill, net ton; standard section Bessemer rails, Chicago, \$38, base; open-hearth, \$40; light rails, 25 to 45 lb., \$52; 16 to 20 lb., \$53; 12 lb., \$54; 8 lb., \$55; angle bars, 2.25c.

Plates.—All of the mills report themselves as besieged by an urgent inquiry for plates, and necessity is making strange bedfellows in the effort to find accommodation. An Eastern mill which has been quoting 5.25c. for narrow plates for early delivery has advanced to 5.50c., and except in the rare instances where protection of prices below 5c. has not yet expired that quotation is the minimum, and appears to be readily obtainable. We quote for Chicago delivery of plates from mill, at its convenience, 3.939c.; for prompt shipment, in widths up to 72 in., 5.189c., and for wide plates, 5.689c. to 6.19c., depending upon deliveries.

We quote for Chicago delivery of plates out of jobbers' stocks, 4.75c.

Sheets.—The greatly restricted condition of the market as regards sheets admits of little change from week to week, and few transactions having any new significance are to be recorded. We quote, for Chicago delivery, No. 10 blue annealed, 4.50c. to 4.75c.; box annealed, No. 16 and lighter, 5c. to 5.25c.; No. 28 galvanized, 6.50c. to 6.75c. These quotations are minimum prices for contracts. Early shipment quotations are \$5 to \$10 per ton higher.

We quote for Chicago delivery out of stock, regardless of quantity, as follows: No. 10 blue annealed, 5.25c.; No. 28 black, 5.40c.; No. 28 galvanized, 7.50c.

Bars.—The buying of steel bars by a considerable number of the implement interests, both to fill out last-half requirements and for first-half shipment, specifications to be submitted in full in the last half, has been concluded and in the end involved a round tonnage. Prices seem to have been taken for granted. Business in hard steel and iron bars, while not of noteworthy size, continues sufficient to keep the mills sold up to capacity for some time in the future. We quote mill shipment, Chicago, as follows: Bar iron, 3c. to 3.25c.; soft steel bars, 3.189c. to 3.439c.; hard steel bars, 3c. to 3.25c.;

shafting, in carloads, 20 per cent off; less than carloads, 15 per cent off.

We now quote store prices for Chicago delivery as follows: Soft steel bars, 3.75c.; bar iron, 3.75c.; reinforcing bars, 3.75c., base, with 5c. extra for twisting in sizes $\frac{1}{2}$ in. and over and usual card extras for smaller sizes; shafting 1st plus 5 per cent.

Rivets and Bolts.—Bolt users are making contracts for second quarter deliveries and are showing some interest in the last half period, while some of the automobile manufacturers are asking for quotations for the year ending July, 1918. Current orders are almost entirely in the form of specification against contracts. Rivet makers' quotations, while in a number of instances nominal, where the manufacturers have nothing to sell, are being generally maintained on the minimum basis of 4.25c., Pittsburgh. We quote as follows: Carriage bolts up to $\frac{3}{4}$ x 6 in., rolled thread, 40-10; cut thread, 40-2 $\frac{1}{2}$; larger sizes, 30-5; machine bolts up to $\frac{3}{4}$ x 4 in., rolled thread, with hot pressed square nuts, 50; cut thread, 40-10; large size, 35-5; gimlet-point coach screws, 50; hot pressed nuts, square, \$2.50 off per 100 lb.; hexagon, \$2.60 off. Structural rivets, $\frac{3}{4}$ to 1 $\frac{1}{4}$ in., 4.40c. to 4.45c., base, Chicago, in carload lots; boiler rivets, 10c. additional.

Store prices are as follows: Structural rivets, 4.50c.; boiler rivets, 4.60c.; machine bolts up to $\frac{3}{4}$ x 4 in., 40-10; larger sizes, 35-5; carriage bolts up to $\frac{3}{4}$ x 6 in., 40-2 $\frac{1}{2}$; larger sizes, 30-5; hot pressed nuts, square, \$3, and hexagon, \$3 off per 100 lb.; lag screws, 50.

Cast-Iron Pipe.—The American Cast Iron Pipe Company is the low bidder for 500 tons at Evansville, Ind.; the National Cast Iron Pipe Company for 250 tons at Oak Park, Ill., and the placing of 200 tons at Castlewood, S. D., is also noted. We quote as follows, per net ton, Chicago: Water pipe, 4-in., \$45.50; 6-in. and larger, \$42.50, with \$1 extra for class A water pipe and gas pipe.

Old Material.—Quotations of the past week show that headway is being made in the direction of higher prices for the commonly used grades of scrap. Railroad wrought is decidedly scarce and it is understood the Chicago & Northwestern disposed of a quantity last week on a basis in excess of \$26. Higher prices were paid for busheling also, notwithstanding the fact that the principal user has stopped all incoming shipments pending the unloading of cars on track, while another mill is out of the market. A higher price for carwheels also is being offered, both for shipments to St. Louis territory and for export. It seems probable that none could be obtained for less than \$20. The market is likewise higher for steel scrap and all grades are firm. Intermittent inquiry coming into this market from other districts is sufficient to support the market when local conditions of themselves might otherwise be depressing. The Pennsylvania Lines are offering a list of old material for bids. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton

Old iron rails	\$27.00 to \$28.00
Relaying rails	34.00 to 35.00
Old carwheels	20.00 to 21.00
Old steel rails, rerolling	27.00 to 28.00
Old steel rails, less than 3 ft.	24.50 to 25.00
Heavy melting steel scrap	22.75 to 23.25
Frogs, switches and guards, cut apart	22.75 to 23.25
Shoveling steel	19.50 to 20.00
Steel axle turnings	14.00 to 14.50

Per Net Ton

Iron angles and splice bars	\$27.00 to \$27.50
Iron arch bars and transoms	27.75 to 28.25
Steel angle bars	21.50 to 22.00
Iron car axles	34.00 to 35.00
Steel car axles	34.00 to 35.00
No. 1 railroad wrought	25.00 to 25.50
No. 2 railroad wrought	24.00 to 24.50
Cut forge	24.00 to 24.50
Pipes and flues	14.00 to 14.50
No. 1 busheling	17.00 to 17.50
No. 2 busheling	12.50 to 13.00
Steel knuckles and couplers	22.50 to 23.00
Steel springs	23.50 to 24.00
No. 1 boilers, cut to sheets and rings	13.50 to 14.00
Boiler punchings	18.50 to 19.00
Locomotive tires, smooth	31.00 to 31.50
Machine-shop turnings	9.25 to 9.75
Cast borings	9.25 to 9.75
No. 1 cast scrap	16.50 to 17.00
Stove plate and light cast scrap	12.50 to 13.00
Grate bars	12.50 to 13.00
Brake shoes	12.50 to 13.00
Railroad malleable	18.00 to 18.50
Agricultural malleable	15.50 to 16.00

Wire Products.—Announcement has been made by

the leading interest of an advance of \$4 per ton in the price of plain wire, nails and kindred products and an advance of two points in the price of fence. We quote to jobbers as follows, per 100 lb.: Plain wire, Nos. 6 to 9, base, \$3.439; wire nails, \$3.389; painted barb wire, \$3.539; galvanized barb wire, \$4.239; polished staples, \$3.539; galvanized staples, \$4.239, all Chicago.

Philadelphia

PHILADELPHIA, PA., March 6, 1917.

The tremendous and world-wide demand for plates is easily the feature of the steel situation in this territory. It has brought about another radical advance in prices, and leading makers now ask 5.50c., Pittsburgh base, for ordinary tank plates. For ship plates they quote 7c., mill, and for Lloyd's boiler steel 8.40c., and for marine boiler steel, 15.40c., base, mill. Japan, Great Britain, China and Spain are among the countries seeking material. Nails have been marked up to \$3.20 per keg, an advance of 20c. Labor promises to become more plentiful, one indication of this being the laying off of 1800 men who were employed on munitions by the Baldwin Locomotive Works, in line with Great Britain's requirement that shell contracts must be concluded by March 31. Pig iron is higher, but great uncertainty exists as to its true level, even among the sellers. Wrought scrap is in heavy demand and its prices are higher. The coke situation was becoming easier, but has hardened again as a result of the heavy snowfall of the past few days.

Pig Iron.—Furnace representatives without exception confess that they are more or less at sea in regard to the prices of pig iron. They have but little to sell for the remainder of the year, and what they have in stock is closely held, with the prices for prompt deliveries fixed by the circumstances of the moment. A transaction closed to-day does not indicate what may be done to-morrow. Some selling interests report a good week, while others have been less active, despite the fact that some of the large inquiries referred to a week ago have been closed. The radiator company which was in the market for 3000 tons for Trenton and a like amount for Johnstown has placed orders, taking Southern iron, in part. A Bristol cast-iron pipe company which inquired for 5000 tons has bought; likewise the Baldwin Locomotive Works, whose inquiry called for 3000 to 5000 tons of cylinder iron. The Pennsylvania Railroad has not yet closed for the 500 tons of charcoal iron for which it made inquiry. A Trenton consumer is about to close for 1500 tons of foundry iron. A recent buyer accepted 2500 tons of iron, the analysis of which did not strictly conform to its specifications. A large part of the activity of the week was in Alabama iron, some of the earlier buying of No. 2 having been at \$25, Birmingham, although \$26 has been paid and is now generally quoted. The minimum quotation at furnace for eastern Pennsylvania No. 2 X appears to be \$33, but the price delivered at Philadelphia of this iron is over \$34.50 (second-half delivery), and not a carload is sold without confirmation by the maker. From \$33, furnace, quotations range up to \$36. A producer who quoted \$33, furnace, a week ago now asks \$34.50, furnace, or about \$35.25 delivered, prompt shipment. One maker is quoted as saying that he will not part with any grade under \$40, furnace, which illustrates the bullish sentiment of the entire market. The leading Virginia producer, which is sold up for the remainder of the year, announces its willingness to book business for the first half of 1918 on the basis of \$31, furnace (\$33.75, Philadelphia) for No. 2 X, and \$30.75 for No. 2 plain. In one instance, 200 tons of Virginia No. 2 X was taken for immediate shipment at \$36, furnace, or \$38.75, Philadelphia. On the other hand, prompt Virginia No. 2 X can be had at \$32, furnace, or \$34.75, Philadelphia, and this price has been cut in at least one instance. A Virginia producer, who, though out of the market for this year, was approached by one of his customers who was interested in the last half, offered \$32, furnace, or \$34.75, Philadelphia. No activity was reported, barring the sale of one carload. It is certain that higher prices will be asked as inquiry develops. Standard low phosphorus is

nominally quoted at \$62, Philadelphia, and it is scarcer than ever. Copper bearing low-phosphorus iron running high in silicon is held at \$60 and upward, furnace. Quotations for standard brands delivered in buyers' yards, prompt shipment, range about as follows:

Eastern Pa. No. 2 X foundry.....	\$34.75 to \$35.25
Eastern Pa. No. 2 plain.....	34.25 to 34.75
Virginia No. 2 X foundry.....	34.75 to 35.25
Virginia No. 2 plain.....	34.50 to 35.00
Gray forge	29.75 to 30.75
Basic	30.50 to 31.50
Standard low phosphorus.....	62.00

Iron Ore.—Arrivals of iron ore at this port in the week ended March 3 consisted of 1313 tons from Sweden and 9928 tons from Spain.

Ferroalloys.—The quotation for foreign 80 per cent ferromanganese, forward delivery, is unchanged at \$185, seaboard, but at least one maker has withdrawn from the market for the remainder of the year. Domestic quotations are firm, and sales of odd carloads of prompt have been made at \$300, delivered. Third quarter is around \$275, delivered, and last quarter about \$250. Spiegeleisen for third-quarter delivery is quoted from \$75 to \$80, fourth quarter being lower. Bessemer ferro-silicon, 11 per cent, is quoted at \$48.50., furnace, or \$51.99, Philadelphia, by one maker.

Plates.—Producers are trying to stem the tide of demand, and as a step in that direction have advanced their quotation for tank plates to 5.50c., Pittsburgh, or 5.659c., Philadelphia, and for ship plates to 7c., base, mill. A leading maker quotes Lloyd's boiler steel at 8.40c., and marine boiler steel at 15.40c., base, mill. At the higher quotation for ordinary tank plates, mills are quoting to their regular customers only and for shipment at the mill's convenience. In spite of the high prices, contracts are sought for as long a period as the mills will accept them. In this connection, it is noted that work which has been held up for months, because of high prices, has been released, it now being realized that higher rather than lower prices are to be expected. One lot of 10,000 tons of ship plates for 1918 delivery to Japan has been booked in the past week at 6c., Pittsburgh. Foreign buyers are finding it increasingly difficult to secure prices because of the oversold condition of the mills. An English representative is trying to buy 18,000 tons of hull steel for 6 steamers. A Spanish interest wants many thousand tons of plates, shapes and light sheets, while other inquiries call for 7000 tons of hull steel and 750 tons of marine boiler steel. Buyers are so eager to obtain material that an offer of 6c., Pittsburgh, was made for any quantity the mill chose to accept for 1917 shipment, but only to be rejected. On 6000 tons for delivery to China 6.50c., Pittsburgh, was quoted, subject to immediate acceptance. Spaniards are in the market for 2600 freight cars of 20-ton capacity.

Structural Material.—The Strawbridge & Clothier Building, Philadelphia, which will require about 700 tons of steel for concrete reinforcement and for a railroad siding is the most active proposition before this market. The Curtis Publishing Company is taking tentative bids on a building for the Philadelphia *Ledger* at Chestnut and Sixth to Seventh streets, which will require about 5000 tons. The Bell Telephone Company has taken figures on a building in this city requiring 500 tons. Quotations are unchanged at 3.659c. to 3.909c., Philadelphia. Ship shapes have been advanced by one maker to 4.50c., Pittsburgh, base.

Billets.—Open-hearth rerolling billets are entirely nominal at \$65, mill, the leading mills having none to sell. Forging steel is likewise nominal at \$85, but it is certain that \$90 or more would be asked were any available.

Bars.—The minimum for steel bars continues at 3.409c., Philadelphia, with up to 3.659c. asked. Few or no second-quarter contracts are being booked. Iron bars also are quoted at 3.409c., Philadelphia, carload lots.

Coke.—The spot market was becoming easier when the recent heavy fall of snow again blocked both oven and railroad operations. Spot furnace on Saturday was down to \$10.50 per net ton at oven, but yesterday \$11 was the best that could be done. Contract furnace is

nominally quoted at \$6 to \$8.50. Several interests have advanced their price for contract foundry to \$7.50 per net ton at oven. One maker who sold at \$7.20 has withdrawn that price and is expected to go to \$7.70. Spot foundry was purchased yesterday at \$13. Freight rates from the principal producing districts are as follows: Connellsville, \$2.05; Latrobe, \$1.85, and Mount-ain, \$1.65.

Sheets.—The demand is good, with the mills having about all the business they can take on for nearby delivery. The minimum quotation is 4.909c., Philadelphia, for No. 10 blue annealed.

Old Material.—The feature of the market lies in the heavy demand for wrought scrap, the prices of which are consequently higher. Quotations for delivery in buyers' yards in this district, covering eastern Pennsylvania and taking freight rates from 35c. to \$1.35 per gross ton, are as follows:

No. 1 heavy melting steel.....	\$22.00 to \$23.00
Old steel rails, rerolling.....	30.00 to 31.00
Low phos. heavy melting steel scrap.....	31.00 to 33.00
Old iron and steel axles (for export).....	43.00 to 45.00
Old iron rails.....	28.00 to 29.00
Old carwheels.....	20.50 to 21.00
No. 1 railroad wrought.....	19.00 to 20.00
Wrought-iron pipe.....	19.00 to 20.00
No. 1 forge fire.....	16.00 to 16.50
Bundled sheets.....	16.00 to 16.50
No. 2 busheling.....	13.00 to 14.00
Machine-shop turnings.....	13.50 to 14.00
Cast borings.....	14.50 to 15.00
No. 1 cast.....	20.00 to 21.00
Grate bars, railroad.....	15.50 to 16.00
Stove plate.....	16.00 to 16.50
Railroad malleable.....	17.50 to 18.00

Cleveland

CLEVELAND, OHIO, March 6, 1917.

Iron Ore.—Shipping orders are good, but the return to unfavorable weather conditions early this week interfered with the movement. Railroads are accepting ore shipments from Cleveland and an embargo at Toledo has been lifted. The market is inactive. We quote prices as follows, delivered lower lake reports: Old Range Bessemer, \$5.95; Mesaba Bessemer, \$5.70; old range non-Bessemer, \$5.20; Mesaba non-Bessemer, \$5.05.

Pig Iron.—There is considerable demand for foundry and malleable iron, mostly for last half delivery, although there is still considerable inquiry for these grades for prompt shipment. Some producers, who recently regarded the \$25 price as prohibitive, are now coming into the market and are showing considerable anxiety lest they will be unable to cover with contracts for last half. Prices are firmer. The only interest that has Cleveland-made iron to offer has advanced its price to \$37 for delivery before July, and in Toledo, the last half price on foundry iron has been advanced to \$35, higher prices being asked for early delivery. We note the sale of 500 tons of Toledo iron at \$35 for No. 2 for Cleveland delivery during the last half, the freight rate being \$1.26. A Canton consumer, who was in the market a few days ago for 5000 tons of basic iron, is understood to have placed an order for this iron. A great deal of foreign inquiry has again sprung up for Bessemer iron. Southern iron has advanced sharply, and it is claimed that \$27, Birmingham, is at present the minimum price for No. 2. We note the sale of 1000 tons to a Cleveland foundry in several small lots at \$27. Some makers are now asking \$30. Several Southern producers are now out of the market. There is a heavy demand for Southern iron for early shipment, but little to be had, as foundries are now behind on their shipments. The embargo situation, both in respect to shipments of Southern iron and iron from southern Ohio, is fully as serious as it has been at any time. Silvery iron is scarce, and some consumers are badly in need of this iron. We note the sale of small lots of Ohio silvery at \$42 to \$42.50 for 8 per cent silicon. We quote delivered Cleveland as follows:

Bessemer	\$35.95 to \$36.95
Basic	30.95 to 31.95
Northern No. 2 foundry.....	35.30 to 37.30
Southern No. 2 foundry.....	31.00 to 34.00
Gray forge	31.95 to 32.95
Ohio silvery, 8 per cent silicon.....	41.62 to 43.62
Standard low-phos., Valley furnace.....	76.00

Coke.—The situation shows no improvement and several foundries in this territory have been forced to shut down a day or two the past week for lack of fuel. Standard Connellsville foundry coke for spot shipment is quoted at \$14 per net ton at oven for prompt shipment. For contracts starting in July, \$7 to \$8 and higher is asked. One producer who has been quite active in booking contracts at \$7 has withdrawn from the market. In furnace coke, we note the sale of 2000 tons standard Connellsville coke to a Cleveland interest at \$11.

Finished Iron and Steel.—A heavy volume of inquiry is coming out for finished steel for any delivery that mills are able to make. Some of the mills that have been holding off are now booking orders for third and fourth quarter deliveries, and there is some inquiry for steel for use during the first half of 1918, consumers being willing to contract at the present time and to take shipments at any time the mills are able to make them in order to be sure of having the material when needed. The railroad situation in Cleveland and vicinity is fully as bad as it has been at any time during the past few weeks, and the outputs of some plants are being curtailed because of lack of material. Some consumers, able to secure shipments by railroad, find that mills are not in a position to roll their material for the reason that they will be unable to ship other material in the same rolling. The demand for plates is still heavy, and quotations range from 4c. to 4.50c., Pittsburgh, for contracts with regular trade, and 5c. to 5.25c. for early shipment. One Eastern mill has advanced its plate price to 5.50c. A Canadian shipbuilding company has an inquiry out for 3000 tons of plates and shapes for an ocean boat. Structural material is in good demand in spite of the fact that there is little new building work. Quotations on structural shapes range from 3.25c. to 4c., Pittsburgh. Prices on hard steel bar are still irregular. Sales are being made at 3c., although that price is being shaded by some makers. Bar iron is firm at 3c. Cleveland for outside delivery and about 3.10c. for delivery in this city and immediate territory. The demand for sheets continues very heavy. Some of the large Detroit automobile manufacturers are trying to cover for the last half. Because of the embargoes and car shortages, which are interfering with deliveries of sheet bars and shipments of finished stock, some of the Ohio mills are out of the market. Mills are having no trouble in getting as high as 5.50c. for No. 28 black sheets. We quote sheets at 4.75c. to 5.50c., Ohio mill, for No. 28 black, 4.75c. to 5c. for No. 10 blue annealed, and 6.75c. to 7c. for No. 28 galvanized. Warehouse prices are 4c. for steel bars, 4.10c. for structural material, 5c. for plates, 5c. for hoops, and 5c. for blue annealed sheets.

Bolts, Nuts and Rivets.—The demand for bolts and nuts is more active than for some time. There is considerable inquiry for second quarter contracts. Production is being seriously interfered with because makers are unable to get raw material. The demand for rivets is heavy, particularly from shipyards. New inquiries from this source for about 2000 tons are pending. Prices are unchanged at 4.25 cents, Pittsburgh, for structural and 4.35 cents for boiler rivets. Bolt and nut discounts are as follows:

Common carriage bolts, $\frac{3}{4}$ x 6 in., smaller or shorter, rolled thread, 40 and 10; cut thread, 40 and 2½; larger or longer, 30 and 5. Machine bolts with h.p. nuts, $\frac{3}{4}$ x 4 in., smaller or shorter, rolled thread, 50; cut thread, 40 and 10; larger or longer, 35 and 5. Lag bolts, cone point, 50. Square and hexagon, h.p. nuts, blank, \$2.50 off the list; tapped, \$2.30 off. C.p.c. and t. hexagon nuts, all sizes, blank, \$2.25 off; tapped, \$2 off. Cold pressed semi-finished hexagon nuts, 50, 10 and 5 off.

Old Material.—The market is firm but quiet. Cast scrap is more active than for some time owing to the scarcity of pig iron, and the price on this grade has further advanced. Dealers having short orders are paying in some cases higher prices than prevailed a week ago. The demand for borings and turnings has improved and prices on these are 25 cents a ton higher. Busheling has also been marked up about 25 cents. Mills are still out of the market, but dealers look for some demand from consumers toward the end of the month. Ship-

ments are still being seriously interfered with by embargoes. We quote, f.o.b. Cleveland, as follows:

Per Gross Ton	
Steel rails	\$21.00 to \$21.50
Steel rails, rerolling	26.00 to 27.00
Steel rails under 3 ft.	26.00 to 26.50
Iron rails	28.00 to 28.50
Steel car axles	47.00 to 48.00
Heavy melting steel	22.50 to 23.00
Carwheels	19.50 to 20.00
Relaying rails, 50 lb. and over	37.00 to 38.00
Agricultural malleable	15.00 to 15.50
Railroad malleable	20.50 to 21.00
Steel axle turnings	16.50 to 17.00
Light bundled sheet scrap	14.50 to 15.00
Per Net Ton	
Iron car axles	\$44.00 to \$45.00
Cast borings	9.00 to 9.25
Iron and steel turnings and drillings	9.00 to 9.25
No. 1 busheling	18.25 to 18.50
No. 1 railroad wrought	24.00 to 25.00
No. 1 cast	18.00 to 19.00
Railroad grate bars	13.00 to 13.25
Stove plate	12.75 to 13.00

Cincinnati

CINCINNATI, OHIO, March 7, 1917.—(By Wire.)

Pig Iron.—Southern foundry iron prices have again been advanced, and within the past few days several sales of No. 2 foundry have been made for first-half shipment at \$28, Birmingham basis. Two central Ohio firms took 500 tons each for this delivery, and small lots were sold at the same figure for March, April and May shipments. Firms willing the first part of last week to take business at \$26 for that delivery have withdrawn from the market or marked up their prompt-shipment quotations from \$1 to \$2 per ton. A Kokomo, Ind., firm purchased 1000 tons of Southern foundry for last-half shipment, and it is understood that this iron was bought below present prompt-shipment prices. A local agency booked several medium-sized orders for Southern iron in the Northwest. Local buying for prompt shipment has been cut off to a considerable extent, principally due to railroad freight embargoes. For last-half shipment there seems to be some hesitancy on the part of melters to pay prices heretofore unknown as far as future contracting is concerned. Last-half quotations range from \$27 to \$30. Standard Southern car-wheel iron has been advanced. Northern foundry iron is very firm at \$35, Ironton, for any shipment this year, but there is very little iron that has not been contracted for in that district for movement before July 1. A large Virginia furnace has formally opened its books for the first half of next year, quoting \$31 at furnace, for No. 2X. The same producer is asking \$33 for shipment this year. A southern Ohio rolling mill purchased approximately 5000 tons of Valley basic for first-half delivery. A recent inquiry for Ohio silvery iron for first-half shipment brought out prices ranging from \$42 to \$45, at furnace, based on an 8 per cent analysis. Based on freight rates of \$2.90 from Birmingham, and \$1.26 from Ironton, we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 1 f.dry and 1 soft	\$30.40 to \$30.90
Southern coke, No. 2 f.dry and 2 soft	29.90 to 30.40
Southern coke, No. 3 foundry	29.40 to 29.90
Southern coke, No. 4 foundry	28.90 to 29.40
Southern gray forge	25.90 to 26.40
Ohio silvery, 8 per cent silicon	42.26 to 44.26
Southern Ohio coke, No. 1	35.76
Southern Ohio coke, No. 2	35.26
Southern Ohio coke, No. 3	34.76
Southern Ohio malleable Bessemer	35.26
Basic, Northern	35.26
Lake Superior charcoal	35.20
Standard Southern carwheel	32.90

(By Mail)

Coke.—Quite a number of foundry coke contracts have been made lately, with shipments to begin July 1. Some of these are for a 12 months' supply, but the majority are for the last half of this year. Connellsville and Wise County producers obtained a large part of this business, some going to Pocahontas. Contract prices of all three are about on the same level, ranging from \$7.50 to \$9 per net ton at oven, although some has been bought at \$7 within the past few days. For spot shipment there are no fixed quotations, prices paid ranging from \$12.50 to \$14.50 at oven. Furnace coke consumers are mainly concerned in getting sufficient fuel on old contracts to keep them operating. As far as can be ascertained none of the furnaces in this terri-

tory have made any late contracts. Contract quotations range from \$7 to \$8 per net ton at oven.

Finished Material.—A nearby rolling mill is to-day quoting No. 28 black sheets at 5.40c. and No. 28 galvanized at 7.40c., Cincinnati or Newport, and No. 10 blue annealed at 5.15c. Orders have been coming in at a rapid rate, most of which are for prompt shipment. The jobbers report a very active demand for nearly all kinds of finished material, although weather conditions tend to cut off the call for structural shapes to some extent. This is welcomed, in a way, as the transportation situation again causes trouble that had been alleviated to some extent two weeks ago. Both wholesale and retail dealers in mill and machine shop supplies state that business was above the average in February. Manufacturers have sent out notices advancing machine screws, wood screws, nuts, rivets, and other like articles 10 per cent for second-quarter shipment orders. We quote local prices from store as follows: Structural shapes, 4.10c.; plates, $\frac{1}{4}$ in. heavier, 5c.; No. 10 blue annealed sheets, 5.25c.; steel bars, 3.90c.; rounds and squares, 2 in. and over, 4.45c., base; flat bars, over 1 in. thick, 4.45c., base; twisted steel bars, 4.05c.; wire nails, \$3.40 to \$3.50 per keg, base; barb wire, \$4.20 to \$4.30 per 100 lb.; machine bolts, $\frac{3}{8}$ x 4 in. and smaller, 50 per cent discount; larger and longer, 30 and 10 per cent discount; hack saws, 10 per cent discount; set screws 45 per cent discount, and files, 50 and 10 per cent discount.

Old Material.—Both inbound and outbound shipments are hampered by railroad freight embargoes. Prices are unchanged but very firm at the quotations given. Heavy melting steel continues in good demand. Different grades of wrought scrap are also wanted by consumers in the Central West. The following are dealers' prices, f.o.b. at yards, southern Ohio and Cincinnati:

Per Gross Ton	
Bundled sheet scrap.....	\$15.00 to \$15.50
Old iron rails.....	24.75 to 25.25
Relaying rails, 50 lb. and up.....	28.25 to 28.75
Re-rolling steel rails.....	24.75 to 25.25
Heavy melting steel scrap.....	21.25 to 21.75
Steel rails for melting.....	21.25 to 21.75

Per Net Ton	
No. 1 railroad wrought.....	\$22.00 to \$22.50
Cast borings.....	6.50 to 7.00
Steel turnings.....	6.50 to 7.00
Railroad cast.....	16.25 to 17.25
No. 1 machinery cast.....	18.00 to 18.50
Burnt scrap.....	10.25 to 10.75
Iron axles.....	33.50 to 34.00
Locomotive tires (smooth inside).....	28.00 to 28.50
Pipes and flues.....	13.75 to 14.25
Malleable cast.....	15.25 to 15.75
Railroad tank and sheet.....	12.25 to 12.75

Birmingham

BIRMINGHAM, ALA., March 5, 1917.

Pig Iron.—On Thursday, March 1, a local furnace company sold 1000 tons of No. 2 foundry to a Southern consumer at \$26; on the following day several bookings, aggregating 500 to 600 tons, were made at \$27, and the company then announced that price as its minimum, stating, in addition, that sales thereafter would have to be confirmed at headquarters before the orders would be entered, which is the same as to say that further rises are anticipated. The leading interest on Friday quoted a minimum of \$26. The leading foundry iron maker, on the same day, marked its price up to \$27, and announced that it was not seeking business. Practically all producers have taken all they care to at present figures, high as they are. There is no difference between spot and forward iron and sales are mostly for second half. A prominent furnaceman made this statement: "Southern iron is simply rising to Northern iron levels. The new business and the rise are due to the sold-up condition of Northern furnaces and the actual demand for the iron for melting purposes. Embargoes have nothing to do with it. There is nothing artificial about it." Production is at its maximum, and shipments are in greater volume than during the prior two weeks, although the car situation is still grave. The market is stronger at the advanced prices than it was Jan. 1, at \$24 for spot and \$23 for second half. The inquiry is insistent and the pleas for

prompt shipment are also insistent. We quote, per gross ton, f.o.b. Birmingham district furnaces, as follows:

No. 1 foundry and soft.....	\$26.50 to \$27.50
No. 2 foundry and soft.....	26.00 to 27.00
No. 3 foundry.....	25.50 to 26.50
No. 4 foundry.....	25.25 to 26.25
Gray forge.....	25.00 to 26.00
Basic.....	26.00 to 27.00
Charcoal.....	27.50 to 28.00

Cast-Iron Pipe.—An order for 500 tons for Dallas, Texas, was among those received this week. Customers compelled to have pipe in spite of high prices, and able to stand them, continue to come in with orders sufficient to maintain the standard of operations, but, in many instances, original specifications are considerably curtailed. Prices are up another \$1 per ton. We quote, per net ton, f.o.b. Birmingham district pipe shops, as follows: 4-in., \$40; 6-in. and upward, \$37, with \$1 added for gas pipe and special lengths.

Steel Bars.—Manufacturers quote steel bars at 3.30c. to 3.50c., Birmingham, in carload lots.

Coal and Coke.—Steam coal is bringing slightly higher prices. The range is from \$2 to \$3.50 per net ton at mine, the former representing the lowest price on forward contracts, the latter the high on spot. Mines are very active and both river and rail shipments are heavy. Standard beehive foundry coke is selling at a minimum of \$12 per net ton at oven for spot and \$8.50 on forward contracts, with still higher prices secured in instances. Furnace coke sells at \$5 to \$5.50, with little to be had. All kinds of coke are scarce.

Old Material.—The scrap market is not active. Proffers by distant consumers of business at higher than Southern consumers offer do not result in transactions of any consequence on account of embargoes and other objections. Steel melting scrap is moving in fair quantities. We quote, per gross ton, f.o.b. yards, as follows:

Old steel axles.....	\$34.00 to \$36.00
Old steel rails.....	19.00 to 19.50
No. 1 wrought.....	18.00 to 19.00
No. 1 melting steel.....	15.00 to 15.50
No. 1 machinery.....	16.50 to 17.00
Carwheels.....	17.00 to 18.00
Tram carwheels.....	12.00 to 12.50
Stove plate and light.....	11.00 to 11.50
Machine-shop turnings and borings...	8.00 to 8.50

New York

NEW YORK, March 7, 1917.

Pig Iron.—Sales in the Eastern territory in the last week have amounted to about 10,000 tons, including 3000 tons for shipment into New England over the second half of the year; 2000 tons of resale iron at \$35, Buffalo furnace; 2000 tons of Alabama iron for Eastern shipment, and several thousand tons of Southern iron at \$25, Birmingham, for No. 2, for export. Eastern Pennsylvania metal is again stronger, with sales of several lots at \$34 to \$35 for No. 2 X at the furnace, shipment over the second half of this year. One eastern Pennsylvania plate manufacturer has come into the market for a round tonnage of basic iron. There is small disposition to entertain new export inquiries, recent sellers being more anxious to secure shipment on previous transactions than to obtain new business. One new export inquiry put out in the last day or two is for 10,000 tons of Bessemer iron. It is notable that resale lots of Bessemer iron are still being pressed for sale. Prices of Southern foundry iron cover a wide range, possibly as much as \$7 per ton, some resales having been recently made at \$23, Birmingham, and small lots reported sold as high as \$30. The highest verified sale here was at \$28 per ton. Most of the business was done at \$25 to \$26 for No. 2. One lot of 20,000 tons of Southern basic was sold here for shipment into the St. Louis territory over the second quarter and last half of this year; the price is understood to have been close to \$25 per ton at furnace. The Virginia situation is also unsettled, with prices irregular. One furnace is offering to sell No. 2 foundry at \$32 for shipment over the second quarter. Sales are reported at \$34 to \$35, furnace, for second half shipment. The Virginia Iron, Coal & Coke Company has opened its books for first

half of 1918 business, and in the last day or two has sold 1500 tons of No. 2 at \$31 furnace. The raising of the railroad embargo on iron and coke into New England has relieved the situation there, as far as spot metal is concerned. Foundry coke continues strong and moderately active, with recent sales of 10,000 to 15,000 tons at \$7 to \$7.50 per net ton at the ovens for shipment over the last half of the year. We quote at tidewater for early delivery: No. 1 foundry, \$35 to \$36; No. 2 X, \$34.50 to \$35.50; No. 2 plain, \$34 to \$35; Southern iron at tidewater, \$31.25 to \$32.25 for No. 1 and \$30.25 to \$31.25 for No. 2 foundry and No. 2 soft.

Ferroalloys.—Inquiries before the market amount to 1500 to 2000 tons. The largest of these is about 900 tons from a Canadian consumer and 500 tons from a domestic user. Sales have been very few and the entire market is quieter than in several weeks. Prices for domestic ferromanganese rule the market and they are very firm at \$300, delivered, for first-half and nearby delivery, with \$275 asked for third quarter and \$250 for fourth quarter. It is reported that the large Eastern producer is out of the market except for delivery in the fourth quarter. Representatives of British producers are asking \$185, seaboard, for last half. Several thousand tons have been sold at this new quotation in the last two weeks, but there is absolutely no guarantee as to delivery, so uncertain are the conditions in Great Britain. The opinion is expressed by some dealers that a scarcity may develop in the near future in supplies of manganese ore for some American producers of ferromanganese. It is said that freight room is exceedingly hard to negotiate, no matter what price is paid for the ore. Spiegeleisen is strong and active, at about \$75, furnace, for early delivery, with the quotation for last half nominal at about \$65, furnace. Ferrosilicon, 50 per cent, continues scarce with the demand strong, and with specifications on contract very urgent. There is no quotation, but as high as \$250, delivered, has been obtained.

Structural Material.—Railroads continue actively in the market for bridge work with contracts for about 6000 tons placed, including 1600 tons for the Boston & Maine bridge at Deerfield, Vt., awarded to the American Bridge Company; 1100 tons for the Philadelphia & Reading, of which 800 tons will be furnished by the Phoenix Bridge Company and 300 tons by Lewis F. Shoemaker & Co. The Baltimore & Ohio has given a small order to the King Bridge Company and the Pennsylvania Railroad, after dividing orders for 1600 tons among three shops, and has put out additional inquiries for 9 bridges calling for about 600 tons. The New Haven is out with another inquiry for a 150-ton bridge job. Several additional manufacturing plant extensions have been closed, including 4460 tons for a smelter at Clarks-ville, Arizona, awarded to the Kansas City Structural Steel Company; 600 tons for ore-handling bridges for the Calumet & Hecla Mining Company, to be furnished by the Minneapolis Steel & Machinery Company, and 2000 tons for a charging floor at the Claymont, Del., plant of the Worth Steel Company, awarded to the Fort Pitt Bridge Company. Among the other contracts closed may be mentioned a factory building at Lynn, Mass., for the General Electric Company, requiring 300 tons, taken by the New England Structural Steel Company; a highway bridge over the barge canal, 300 tons, given to the American Bridge Company; 300 tons for an addition to the Masonic Temple, Cleveland, awarded to the American Bridge Company; a bakery at Utica, placed with the Utica Steam Engine & Boiler Company; a high school at Syracuse, placed with the Utica Structural Steel Company, and an addition to the Rome Mfg. Company plant, Rome, N. Y., placed with Smith & Caffery. The last four contracts amount to about 600 tons, for which Bethlehem sections have been specified. Harris, Silvers, Baker Company has taken a contract for a Keith theater at Syracuse, and the 975 tons required will be furnished from stock. Among the new inquiries in the market are four high schools and an office building at Syracuse, an Odd Fellows lodge and store at Washington, requiring 500 tons, and a court house at Birmingham, Ala., requiring 750 tons of steel shapes. We quote mill shipments of shapes in two to five months

at 3.419c. to 4.169c., New York. Warehouse shipments are now at 4.10c., New York.

Billets, Bars and Rods.—Eastern manufacturers of agricultural machinery have placed additional contracts for soft steel bars and for other steel specialties with Eastern mills for shipment over the second half of this year. An eastern Pennsylvania mill within the last few days has booked substantial orders at 3¼c. per lb., mill. Several new inquiries for shell bars have come out in the last day or two, including one lot of 20,000 to 40,000 tons for export to France over the last half of this year. A heavy demand for wire rods has been experienced in the last week, with sales aggregating 9000 tons for domestic shipment over the second quarter of this year. Small lots of high carbon rods have sold as high as \$125 per ton; other sales of special carbon have been made at \$90 to \$110 per ton, while ordinary rods have sold at \$80 per ton for export. Recent resales of Bessemer billets have been made at \$60 per ton or less for export, and there are other offerings in the market of from 3000 up to 15,000 tons each. There is a wide range in billet prices, probably as much as \$7 per ton for ordinary 4 x 4 and 6 x 6 rerolling steel. We quote mill shipments of steel bars at 3.169c. to 3.669c., New York, the lower price for indefinite delivery and the higher for small quantities in, say, three months. We quote mill shipments of bar iron at 3.419c., New York. Out of warehouse iron bars are 3.70c., and steel bars 4c., New York.

Steel Plates.—Shipbuilders on the Delaware River, who are understood to have taken large orders for boats from the Cunard line, are actively in the market for a large tonnage of plates and shapes, estimated at 60,000 tons of plates and 25,000 tons of marine shapes. Two other domestic boat builders are actively seeking to place contracts for plates to be shipped over the first half of 1918. Japanese builders have placed another contract for 10,000 tons of ship plates at 6½c. per lb. with an eastern Pennsylvania mill and are still actively negotiating for additional tonnages for shipment during the first six months of next year. Other new foreign inquiries include 2000 tons and 4000 tons for China and 1500 tons for Holland. A Chicago mill is reported to have sold through local interests 12,000 tons of ship plates for export to France. Two of the eastern Pennsylvania mills have advanced prices on both ship plates and structural plates \$10 per ton, ship plates now being held at 7c. per lb. and tank plates at 5½c. per lb. Several Eastern manufacturers engaged on Government contracts, who found difficulty in securing shipment from the mills, appealed to the Government for assistance, which was promptly given, and early shipments made as desired. It is understood that the United States Government 1917 naval program calls for a little in excess of 200,000 tons of plates and shapes, not including armor plate. It will be recalled that the 1916 program, with armor plate, required the purchase of approximately 216,000 tons of plates and shapes. It is reported that the Cunard Line has placed contracts for 32 boats in this country, including several now on the ways; two of the boats sold by the Sun Shipbuilding Company were being constructed on stock account. We quote best deliveries on universal plates at 4.919c. to 5.169c., New York; ordinary tank plates at 5.169c. to 5.669c., and ship plates at 6.169c. to 7.169c., but indefinite delivery plates at 3.919c., New York. Out of store we quote 5c. and higher.

Cast-Iron Pipe.—Municipal lettings are still few in number. Ogdensburg, N. J., will open bids March 15 on 500 tons of 6 to 16 in. This appears to be about the only important letting now pending in this locality, but inquiries from private buyers are increasing. Prices are maintained. Carload lots of 6-in., class B and heavier, are selling at \$41.50 per net ton, tidewater, with class A and gas pipe taking an extra of \$1 per ton.

Rails and Railroad Equipment.—Domestic railroads are finding much difficulty in placing contracts for standard section rails for shipment before the summer of 1918. Eastern roads have just closed contracts for about 8000 tons of standard sections and about 1500 tons of girder rails. One Brooklyn inquiry now in

the market is for 800 tons of girder rails. An Eastern mill has sold 10,000 tons of heavy rails for export to France and negotiations continue on 50,000 to 100,000 for France. There are also active negotiations for round tonnages for shipment to Sweden, Denmark and Spain. The Cambria Steel Company is to build 1000 steel coal cars for the Midvale Steel & Ordnance Company.

Old Material.—Steel scrap is not quite so active, as exporters are finding some difficulty in securing vessel accommodations. Wrought scrap continues in heavy demand, while borings and turnings are also moving in good volume. Brokers quote buying prices as follows to local dealers and producers, per gross ton, New York:

Heavy melting steel scrap.....	\$20.00 to \$20.50
Relaying rails	40.00 to 41.00
Rerolling rails	29.00 to 30.00
Iron and steel car axles.....	40.00 to 43.00
No. 1 railroad wrought.....	27.00 to 28.00
Wrought-iron track scrap.....	24.00 to 25.00
No. 1 yard wrought, long.....	23.00 to 24.00
Light iron	7.00 to 8.00
Cast borings (clean).....	12.50 to 13.00
Machine shop turnings.....	11.50 to 12.00
Mixed borings and turnings.....	10.50 to 11.00
Wrought-iron pipe (not galvanized or enameled)	17.00 to 17.50

Cast scrap continues in good demand. Prices are well maintained. The quotations given below are paid by consumers purchasing in good quantities, but foundries in New York City and Brooklyn are securing small lots of Nos. 1 and 2 cast from nearby dealers at \$1.50 to \$2 less per gross ton:

No. 1 cast	\$21.50 to \$22.00
No. 2 cast	19.00 to 20.00
Stove plate	14.50 to 15.00
Locomotive grate bars.....	15.00 to 15.50
Old carwheels	21.00 to 21.50
Malleable cast (railroad).....	20.00 to 20.50

St. Louis

ST. LOUIS, MO., March 5, 1917.

Pig Iron.—An increasing demand is apparent. One local interest is seeking about 20,000 tons of basic but without, so far as known, developing any producer willing at present to take the order. Other inquiries include one of 1000 tons of No. 2 Southern and one of about 1750 tons of various grades, chiefly, however, No. 3 Southern. Several smaller inquiries are reported. In the sales of the week were included one of 1000 tons, several of 200 tons or less and two or three for quantities between 200 and 500 tons, and one of 200 tons of Lake Superior charcoal. Several lots of ferromanganese were included in the week's business, the principal transactions being one of 450 tons at \$185, seaboard, and one of 50 tons at a slightly higher price. High silicon irons continue to be wanted.

Coke.—The price is altogether a matter between buyer and seller at the moment of closing. The latter part of last week there was some selling for forward delivery.

Finished Iron and Steel.—No new transactions of moment appear but specifications continue urgent and fully up to contract allotments. The demand for light rails is increasing at a good rate, while prices have been advanced to \$50, Chicago. Track fastenings are in active specification for spring work. Movement out of warehouse is very large at these firmly held quotations: Soft steel bars, 3.80c.; iron bars, 3.75c.; structural material, 4.05c.; tank plates, 4.80c.; No. 10 blue annealed sheets, 5.30c.; No. 28 black sheets, cold rolled, one pass, 5.75c.; No. 28 galvanized sheets, 8c. A further advance in warehouse stock is expected, however, before the week closes.

Old Material.—In scrap the market started upward early in the past week and is to-day strong at sharply higher quotations. Most of the advance is due to the activity of dealers who are now both speculating and covering shortages, but local industries are giving evidence of exhaustion of surplus stocks and are entering the market, though they are paying the dealers' advanced prices only as they are compelled by circumstances to do so. There is evidently a shortage in scrap and dealers expect further and sharper advances. This shortage is due to some extent to the fact that large dealers shipped away heavily at the time when the local

industries would not make purchases. Carwheels are in very sharp demand and investigation shows that the large tonnage on hand in some yards of consumers, recently reported in this correspondence, has been melted. Lists out during the week include: Mobile & Ohio, 2500 tons; Texas Pacific, 1000 tons; Pennsylvania Western Lines, 6000 tons, and some minor lists. We quote dealers' prices, f.o.b. customers' works, St. Louis industrial district, as follows:

Per Gross Ton	
Old iron rails.....	\$27.00 to \$27.50
Old steel rails, rerolling.....	27.50 to 28.00
Old steel rails, less than 3 ft.....	26.00 to 26.50
Relaying rails, standard section, subject to inspection	34.00 to 35.00
Old carwheels	20.50 to 21.00
No. 1 railroad heavy melting steel scrap	23.50 to 24.00
Heavy shoveling steel.....	21.00 to 21.25
Ordinary shoveling steel	18.50 to 19.00
Frogs, switches and guards cut apart	24.00 to 24.50
Ordinary bundled sheet scrap.....	14.50 to 15.00

Per Net Ton	
Iron angle bars	\$26.00 to \$26.50
Steel angle bars	22.00 to 22.50
Iron car axles	34.50 to 35.00
Steel car axles	34.00 to 34.50
Wrought arch bars and transoms.....	27.50 to 28.00
No. 1 railroad wrought.....	24.50 to 25.00
No. 2 railroad wrought.....	24.00 to 24.50
Railroad springs	23.50 to 24.00
Steel couplers and knuckles.....	25.00 to 25.50
Locomotive tires, 42 in. and over, smooth inside	33.00 to 33.50
No. 1 dealers' forge.....	18.00 to 18.50
Cast iron borings.....	9.50 to 10.00
No. 1 busheling	17.50 to 18.00
No. 1 boilers, cut to sheets and rings.....	14.00 to 14.50
No. 1 railroad cast scrap.....	15.75 to 16.25
Stove plate and light cast scrap.....	11.00 to 11.50
Railroad malleable	17.00 to 17.50
Agricultural malleable	16.00 to 16.50
Pipes and flues.....	15.00 to 15.50
Heavy railroad sheet and tank scrap.....	14.00 to 14.50
Railroad grate bars.....	12.50 to 13.00
Machine shop turnings	10.00 to 10.50
Heavy axle and tire turnings.....	12.50 to 13.00

British Steel Market

Ferromanganese Producers Booked Until Midsummer—Pig Iron Steady
(By Cable)

LONDON, ENGLAND, March 7, 1917.

The pig-iron market is steady and henatite iron is more active. Tin plates are quiet and ferromanganese is firm, but business is difficult as producers are booked until midsummer. Semi-finished steel is nominal and £19 is asked for 4-in. billets, f.o.b. Toluol is quoted at 2s. 3d., with benzol and solvent naphtha unchanged from the prices quoted Feb. 7, 1917. We quote as follows:

Tin plates coke 14 x 20, 112 sheets, 108 lb., f.o.b. Wales, 27s.
Steel black sheets, No. 28, export, f.o.b. Liverpool, £19 5s.
Hematite pig iron, f.o.b. Tees, 142s. 6d.
Sheet bars (Welsh) delivered at works in Swansea Valley, £15 5s. nominal.
Ferromanganese, £37 nominal.
Ferrosilicon, 50 per cent, c.i.f., £35 upward.

The Henry Vogt Machine Company, Louisville, Ky., has taken a contract from the Standard Oil Company of Kentucky for the construction of three 500-hp. boilers and 1000 tons of plate work for the refinery which the company will erect at Louisville at a cost of more than \$1,500,000. The Vogt Company also has an order for six 500-hp. boilers for the Cosden Company, Tulsa, Okla., besides three 500-hp. boilers for the Whiting refinery and two 500-hp. boilers for the Rising Sun Refinery of the Standard Oil Company of Indiana.

The resistance of an oil to emulsification is the subject of technologic paper No. 86, now ready for distribution by the Bureau of Standards, Department of Commerce, Washington, D. C. When oil is used over and over again, as is the usual practice in large power plants, it may emulsify in a few days, if it is not good quality, and have to be thrown away as it will not pass through the filters. A laboratory test has been devised by means of which it may be predicted whether or not the oil would give satisfaction in service.

Empire Steel & Iron Company's Year

At the recent annual meeting of the Empire Steel & Iron Company, the retiring directors were re-elected. President Leonard Peckitt's report showed that the net profits of the company for the year ended Dec. 31, 1916, after setting aside \$106,241 for depreciation and development, were \$593,317. The balance sheet shows current assets of \$1,059,921. This includes cash item of \$190,008, and accounts and notes receivable of \$289,722. Current liabilities amounted to \$654,657, of which \$548,988 is composed of accounts and notes payable. Profit and loss surplus equals \$961,685. The year's output was 212,160 tons of pig iron, while 310,537 tons of iron ore was produced by the mines in New Jersey. The five blast furnaces owned by the company are now producing 22,000 tons of foundry and basic iron monthly, and the output of the ore mines has increased 50 per cent during the last three years. Three dividends, aggregating 8 per cent, were paid during the year on the preferred stock. Mr. Peckitt said that 1916 was the best year his company had experienced since its incorporation in 1900. Net earnings for the last four months have been at the rate of \$900,000 per annum.

Cincinnati Metal Trades Meeting

The annual meeting of the Cincinnati Branch, National Metal Trades Association, was held at the Cincinnati Business Men's Club on the evening of March 1. There was a large attendance and the members generally expressed themselves optimistically as to the future.

The officers were unanimously re-elected as follows: President, A. H. Tuechter; vice-president, J. B. Doan; treasurer, W. T. Emmes; secretary, J. A. LeBlond; business secretary, J. M. Manley. The Executive Council is composed of Murray Shipley, C. H. Fox and E. A. Muller. After the banquet the following speakers were introduced: W. H. Van Dervoort, president National Metal Trades Association, and also of the Van Dervoort & Root Engineering Company, Moline, Ill.; Henry D. Sharpe, president Brown & Sharpe Mfg. Company, Providence, R. I.; H. H. Rice, Indianapolis; W. A. Layman, Wagner Electric Mfg. Company, St. Louis; F. C. Caldwell, H. W. Caldwell & Sons Company, Chicago, and F. A. Geier, Murray Shipley, E. A. Muller and W. T. Emmes, of Cincinnati.

National Founders' Cost-Finding Method

A method of cost-finding in brass, bronze and aluminum foundries is outlined in concise form in bulletin No. 4 of the Service Bureau of the National Founders' Association, 29 South La Salle Street, Chicago. A loose sheet supplement contains the various forms necessary to keep a strict account of expenses during the processing. Each division of the jobbing foundry—melting, holding, core-making, cleaning, inspection, shipping, pattern making, machinery,—together with the raw material and selling of the finished product, bears its expense as determined by actual, not averaged, cost. Metal lost in melting, ranging in amount from 10 to 50 per cent, is charged to the good castings. The bulletin contains 15 pages, 5% by 8 1/2 in.

Employment of Labor in New York

The New York State Department of Labor, through its Bureau of Statistics and Information, has issued a report comparing the labor condition in November and December of last year with January, 1917. Based on conditions in June, 1914, representing 100 per cent, the percentage ratios are as follows:

Industry	Employees			Wages		
	Nov. 1916	Dec. 1916	Jan. 1917	Nov. 1916	Dec. 1916	Jan. 1917
Pig iron and rolling-mill products	144	151	148	199	208	202
Structural and architectural iron work	93	100	101	106	121	121
Firearms, tools and cutlery	254	252	241	339	350	325
Machinery	144	146	144	169	178	172
Cars, locomotives and railway repair shops	121	125	125	151	165	154

Iron and Industrial Stocks

NEW YORK, March 7, 1917.

War clouds are not depressing the stock market. The general expectation that this country will either voluntarily or involuntarily become a participant in the world war is having a stimulating effect on industrial stocks. Practically all securities of this character have shown sharp advances for the past week. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week has been as follows:

Allis-Chal., com., 24 - 28 3/4	Int. Har. Corp., com., 75 1/2 - 78 1/2
Allis-Chal., pref., 81 1/2 - 86 1/2	Int. Har. Corp., pref., 110 1/4
Am. British Mfg., com., 9 - 10	La Belle Iron, com., 83 - 86
Am. Can. com., 40 1/4 - 45 3/4	La Belle Iron, pref., 125
Am. Can. pref., 106 3/4 - 108 1/2	Lackawanna Std., 76 7/8 - 82
Am. Car & Fdy., com., 63 1/2 - 69	Lake Sup. Corp., 19 1/2 - 21 3/4
Am. Car & Fdy., pref., 116 3/4 - 117	Lima Loco., 56 - 59
Am. Loco., com., 68 - 72 1/2	Lukens, com., 38 1/2 - 40
Am. Loco., pref., 103 3/4 - 104	Lukens, 1st pref., 99 - 99 1/2
Am. Rad., com., 440 - 445	Midvale Steel., 52 3/4 - 58
Am. Rad., pref., 135	Nat.-Acme, 32 1/2 - 34 3/4
Am. Ship, com., 61 - 66 3/4	Nat. En. & Stm., com., 31 3/4 - 34 3/4
Am. Ship, pref., 94 1/4	Nat. En. & Stm., pref., 96 - 98
Am. Steel Fdries, 59 3/4 - 65	N. Y. Air Brake, 142 1/2 - 146 3/4
Bald. Loco., com., 50 - 56 1/4	Nova Scotia Steel., 105
Bald. Loco., pref., 101	Pitts. Steel, pref., 99 3/4 - 100
Beth. Steel, com., 119 - 147	Pressed Stl., com., 74 1/2 - 80
Beth. Steel, Class B, 103 - 119	Pressed Stl., pref., 105
Beth. Steel, pref., 117 1/4	Ry. Steel Spring, com., 48 - 51 1/2
Case (J. I.), pref., 85	Ry. Steel Spring, pref., 100
Charcoal Iron, com., 7 1/2 - 8	Republic, com., 75 1/4 - 81 3/4
Charcoal Iron, pref., 6 1/2 - 6 3/4	Republic, pref., 101 1/2 - 102
Chic. Pneu. Tool., 68 - 69	Sloss, com., 57 1/2 - 64 1/2
Colo. Fuel., 44 3/4 - 49 1/2	Sloss, pref., 94
Cruc. Steel, com., 62 1/2 - 68 1/4	Superior Steel., 31 3/4 - 32
Cruc. Steel, pref., 112 - 112 3/4	Superior Steel, 1st pref., 100 - 100 1/4
Deere & Co., pref., 96 3/4	Transue-Williams, 42 7/8 - 43
Driggs-Seabury, 50 - 54 3/4	Un. Alloy Steel., 44 - 48 1/2
Gen. Electric, 161 1/2 - 165 1/2	U. S. Pipe, com., 18 3/4 - 20 1/2
Gt. No. Ore Cert., 31 3/4 - 38 1/2	U. S. Steel, com., 103 1/2 - 111 3/4
Gulf States Steel, 106 - 115 1/2	U. S. Steel, pref., 116 3/4 - 118
Harb.-Walk, Refrac., pref., 105	Va. I. C. & Coke, 52 3/4 - 60
Int. Har. of N. J., com., 113 - 117	Westing. Elec., 47 1/2 - 50 3/4
Int. Har. of N. J., pref., 116 1/2 - 117	

Dividends

The American Car & Foundry Company, extra, 1 per cent, and regular quarterly, 1 per cent on the common in addition to the regular quarterly preferred of 1 3/4 per cent, all payable April 2.

The Haskell & Barker Car Company, regular quarterly of 75c., payable April 2.

The Worthington Pump & Machinery Corporation, regular quarterly, 1 1/4 per cent on the preferred A, payable April 2.

The Continental Can Company, regular, 1 1/4 per cent on the common and 1 3/4 per cent on the preferred, both payable April 1.

The Railway Steel Spring Company, regular quarterly, 1 1/4 per cent on the common, payable March 30, and the regular quarterly, 1 1/4 per cent on the preferred, payable March 20.

The Packard Motor Car Company, regular quarterly, 1 1/4 per cent on the preferred, payable March 15.

The Wheeling Steel & Iron Company, regular quarterly, 2 per cent, payable April 1.

The American Steel Foundries, quarterly, 1 1/4 per cent, payable March 31.

The Allis-Chalmers Mfg. Company, regular quarterly, 1 1/4 per cent on the preferred and extra 3/4 per cent on account of accumulated dividends, both payable April 16.

The Cambria Iron Company, regular semi-annual, 2 per cent, payable April 2.

The Chandler Motor Car Company, regular quarterly, 2 per cent and extra, 1 per cent, payable April 1.

The La Belle Iron Works, regular quarterly, 1 per cent, and extra, 2 per cent, on the common, and regular quarterly, 2 per cent, on the preferred, all payable March 31.

The New Jersey Zinc Company, extra 4 per cent, payable March 10.

The Nova Scotia Steel & Coal Company, regular quarterly, 2 per cent on the preferred, payable April 10.

The Pettibone-Mulliken Company, regular quarterly, on the first and second preferred, 1 1/4 per cent, payable April 1.

The Pierce-Arrow Motor Car Company, regular quarterly, 2 per cent, on the preferred, payable April 2.

The Yale & Towne Mfg. Company, regular quarterly, 2 1/4 per cent, payable April 2.

The National Association of Brass Manufacturers will hold its next meeting at the Congress Hotel, Chicago, March 21 and 22.

Finished Iron and Steel f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, per 100 lb.: New York, 16.9c.; Philadelphia, 15.9c.; Boston, 18.9c.; Buffalo, 11.6c.; Cleveland, 10.5c.; Cincinnati, 15.8c.; Indianapolis, 17.9c.; Chicago, 18.9c.; St. Louis, 23.6c.; Kansas City, 43.6c.; Omaha, 43.6c.; St. Paul, 32.9c.; Denver, 68.6c.; New Orleans, 30.7c.; Birmingham, Ala., 45c. Denver, pipe, 76.1c., minimum carload, 46,000 lb.; structural steel and steel bars, 83.6c., minimum carload, 36,000 lb. Pacific coast (by rail only), pipe, 65c.; structural steel and steel bars, 75c., minimum carload, 50,000 lb.; structural steel and steel bars, 80c., minimum carload, 40,000 lb. No freight rates are being published via the Panama Canal, as the boats are being used in transatlantic trade.

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, $\frac{1}{4}$ in. thick and over, and zees 3 in. and over, 3.25c. to 3.50c. Extras on other shapes and sizes are as follows:

	Cents per lb.
I-beams over 15 in.	.10
H-beams over 18 in.	.10
Angles over 6 in., on one or both legs.	.10
Angles, 3 in. on one or both legs less than $\frac{1}{4}$ in. thick, as per steel bar card, Sept. 1, 1909.	.70
Tees, structural sizes (except elevator, handrail, car truck and conductor rail).	.05
Channels and tees, under 3 in. wide, as per steel bar card, Sept. 1, 1909.	.20 to .80
Deck beams and bulb angles.	.30
Handrail tees.	.75
Cutting to lengths, under 3 ft. to 2 ft. inclusive.	.25
Cutting to lengths, under 2 ft. to 1 ft. inclusive.	.50
Cutting to lengths, under 1 ft.	1.55
No charge for cutting to lengths 3 ft. and over.	

Plates.—Tank plates, $\frac{1}{4}$ in. thick, 6 in. up to 100 in. wide, 3.75c. to 5c., base, net cash, 30 days, or $\frac{1}{2}$ of 1 per cent discount in 10 days, carload lots. Extras are:

Quality Extras	Cents per lb.
Tank steel	Base
Pressing steel (not flange steel for boilers).	.10
Boiler and flange steel plates.	.15
"A. B. M. A." and ordinary firebox steel plates.	.20
Still bottom steel.	.30
Locomotive firebox steel.	.50
Marine steel, special extras and prices on application.	

Gage Extras

Rectangular, $\frac{1}{4}$ in. thick, over 6 in. wide to 100 in. wide. Base	
Lighter than $\frac{1}{4}$ in., to 3/16 in., up to 72 in. wide.	.10
Lighter than $\frac{1}{4}$ in., including 3/16 in., over 72 in. to 84 in.	.20
Lighter than $\frac{1}{4}$ in., including 3/16 in., over 84 in. to 96 in.	.30
Lighter than $\frac{1}{4}$ in., including 3/16 in., over 96 in. to 100 in.	.40
Lighter than $\frac{1}{4}$ in., including 3/16 in., over 100 in. to 102 in.	.45
Lighter than 3/16 in., including No. 8, up to 72 in. wide.	.15
Lighter than 3/16 in., including No. 8, over 72 in. to 84 in.	.25
Lighter than 3/16 in., including No. 8, over 84 in. to 96 in.	.35
Lighter than No. 8, including No. 10, up to 60 in. wide.	.30
Lighter than No. 8, including No. 10, over 60 in. to 64 in.	.35
Up to 72 in. and not less than 10.2 lb. per sq. ft. will be considered $\frac{1}{4}$ in.	
Over 72 in. must be ordered $\frac{1}{4}$ in. thick on edge, or not less than 11 lb. per sq. ft. to take base price.	
Over 72 in. wide, ordered less than 11 lb. per sq. ft., down to weight of 3/16 in., take price of 3/16 in.	
Over 72 in., ordered weight 3/16 in., take No. 8 price.	
Over 72 in., ordered weight No. 8, take No. 10 price.	

Width Extras

Over 100 in. to 110 in. inclusive.	.05
Over 110 in. to 115 in. inclusive.	.10
Over 115 in. to 120 in. inclusive.	.15
Over 120 in. to 125 in. inclusive.	.25
Over 125 in. to 130 in. inclusive.	.50
Over 130 in.	1.00

Length Extras

Universal plates 80 ft. long up to 90 ft. long.	.05
Universal plates 90 ft. long up to 100 ft. long.	.10
Universal plates 100 ft. long up to 110 ft. long.	.20

Cutting Extras

No charge for rectangular plates to lengths 3 ft. and over.	
Lengths under 3 ft. to 2 ft. inclusive.	.25
Lengths under 2 ft. to 1 ft. inclusive.	.50
Lengths under 1 ft.	1.55
Circles 3 ft. in diameter to 100 in.	.30
Circles over 100 to 110 in. (width extra).	.35
Circles over 110 to 115 in. (width extra).	.40
Circles over 115 to 120 in. (width extra).	.45
Circles over 120 to 125 in. (width extra).	.55
Circles over 125 to 130 in. (width extra).	.80
Circles over 130 in. (width extra).	1.30
Circles under 3 ft., to 2 ft., inclusive.	.55
Circles under 2 ft., to 1 ft., inclusive.	.80
Circles under 1 ft.	1.85
Half circles take circle extras.	
Sketches not over four straight cuts, inc. straight taper	.10
Sketches having more than four straight cuts.	.20
Plates sheared to a radius take complete circle extras.	

*Including extra for width.

Wire Rods.—Including chain rods, \$80 to \$85.

Wire Products.—Prices to jobbers, effective March 5: Fence wire Nos. 6 to 9, per 100 lb., terms 60 days or 2 per cent discount in 10 days, carload lots, annealed, \$3.15; galvanized, \$3.85. Galvanized barb wire and

staples, \$4.05; painted, \$3.35. Wire nails, \$3.20. Galvanized nails, 1 in. and longer, \$2.20 advance over base price; shorter than 1 in., \$2.70 advance over base price. Cement-coated nails, \$3.10. Woven wire fencing, 51 per cent off list for carloads, 50 off for 1000-rod lots, 49 off for less than 1000-rod lots.

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card in effect from March 5, 1917, all full weight:

Steel			Iron		
Inches	Black	Galv.	Inches	Black	Galv.
$\frac{1}{8}$, $\frac{1}{4}$ and $\frac{3}{8}$	53	26 $\frac{1}{2}$	$\frac{1}{8}$ and $\frac{1}{4}$	42	15
$\frac{1}{2}$	57	42 $\frac{1}{2}$	$\frac{3}{8}$	43	16
$\frac{3}{4}$ to 3.	60	46 $\frac{1}{2}$	$\frac{1}{2}$	47	29
			$\frac{3}{4}$ to 1 $\frac{1}{2}$	50	36
Lap Weld			Lap Weld		
2	53	40 $\frac{1}{2}$	1 $\frac{1}{4}$	36	21
2 $\frac{1}{2}$ to 6.	56	43 $\frac{1}{2}$	1 $\frac{1}{2}$	42	34
7 to 12.	53	39 $\frac{1}{2}$	2	43	29
13 and 14.	43 $\frac{1}{2}$..	2 $\frac{1}{2}$ to 4.	45	32
15	41	..	4 $\frac{1}{2}$ to 6.	45	32
			7 to 12.	44	31
Reamed and Drifted			Reamed and Drifted		
1 to 3, butt.	58	44 $\frac{1}{2}$	$\frac{3}{4}$ to 1 $\frac{1}{2}$, butt.	45	28
2, lap	51	38 $\frac{1}{2}$	1 $\frac{1}{4}$, lap	37	15
2 $\frac{1}{2}$ to 6, lap.	54	41 $\frac{1}{2}$	1 $\frac{1}{2}$, lap	37	22
			2, lap	38	23
			2 $\frac{1}{2}$ to 4, lap.	41	26
Butt Weld, extra strong, plain ends			Butt Weld, extra strong, plain ends		
$\frac{1}{8}$, $\frac{1}{4}$ and $\frac{3}{8}$	49	31 $\frac{1}{2}$	$\frac{1}{8}$, $\frac{1}{4}$ and $\frac{3}{8}$	42	25
$\frac{1}{2}$	54	41 $\frac{1}{2}$	$\frac{1}{2}$	47	34
$\frac{3}{4}$ to 1 $\frac{1}{2}$	58	45 $\frac{1}{2}$	$\frac{3}{4}$ to 1 $\frac{1}{2}$	51	36
2 to 3.	59	46 $\frac{1}{2}$			
Lap Weld, extra strong, plain ends			Lap Weld, extra strong, plain ends		
2	51	39 $\frac{1}{2}$	1 $\frac{1}{4}$	38	23
2 $\frac{1}{2}$ to 4.	54	42 $\frac{1}{2}$	1 $\frac{1}{2}$	43	29
4 $\frac{1}{2}$ to 6.	53	41 $\frac{1}{2}$	2	45	32
7 to 8.	49	35 $\frac{1}{2}$	2 $\frac{1}{2}$ to 4.	47	35
9 to 12.	46	30 $\frac{1}{2}$	4 $\frac{1}{2}$ to 6.	46	34
			7 to 8.	40	28
			9 to 12.	35	23

To the large jobbing trade an additional 5 per cent is allowed over the above discounts, which are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized, but in some sections of the country discounts on less than carloads are three (3) points less (higher price) than the carload discount on both black and galvanized steel pipe.

On butt and lap weld sizes of black iron pipe, discounts for less than carload lots to jobbers are four (4) points lower (higher price) than carload lots, and on butt and lap weld galvanized iron pipe are five (5) points lower (higher price).

Boiler Tubes.—Discounts on less than carloads freight to be added, effective from Nov. 1, 1916, except 3 to 4 $\frac{1}{2}$ in. steel from Nov. 20, are as follows:

Lap Welded Steel	Standard Charcoal-Iron
1 $\frac{1}{2}$ in.	31
1 $\frac{3}{4}$ and 2 in.	43
2 $\frac{1}{4}$ in.	40
2 $\frac{1}{2}$ and 2 $\frac{3}{4}$ in.	46
3 and 3 $\frac{1}{4}$ in.	46
3 $\frac{1}{2}$ to 4 $\frac{1}{2}$ in.	46
5 and 6 in.	45
7 to 13 in.	42
1 $\frac{1}{2}$ in.	31
1 $\frac{3}{4}$ and 2 in.	43
2 $\frac{1}{4}$ in.	40
2 $\frac{1}{2}$ and 2 $\frac{3}{4}$ in.	46
3 and 3 $\frac{1}{4}$ in.	46
3 $\frac{1}{2}$ to 4 $\frac{1}{2}$ in.	46
5 and 6 in.	45
7 to 13 in.	42

Locomotive and steamship special charcoal grades bring higher prices.

$\frac{1}{4}$ in., over 18 ft., and not exceeding 22 ft., 10 per cent net extra.

2 in. and larger, over 22 ft., 10 per cent net extra.

Sheets.—Makers' prices for mill shipments on sheets of United States standard gage, in carload and larger lots, are as follows, 30 days net, or 2 per cent discount in 10 days:

Blue Annealed Sheets	Cents per lb.
Nos. 3 to 8.	5.00 to 5.25
Nos. 9 to 12.	4.75 to 5.00
Nos. 13 to 16.	4.50 to 4.75
No. 17 and lighter gages are based on \$4.75 per 100 lb. for No. 28 Bessemer black sheets.	
Box Annealed Sheets, Cold Rolled	
Nos. 17 to 21.	4.55 to 4.80
Nos. 22 and 24.	4.60 to 4.85
Nos. 25 and 26.	4.65 to 4.90
No. 27.	4.70 to 4.95
No. 28.	4.75 to 5.00
No. 29.	4.80 to 5.05
No. 30.	4.90 to 5.15
Galvanized Sheets of Black Sheet Gage	
Nos. 10 and 11.	5.50 to 5.75
Nos. 12 to 14.	5.60 to 5.85
Nos. 15 and 16.	5.85 to 6.00
Nos. 17 to 21.	5.90 to 6.15
Nos. 22 and 24.	6.05 to 6.30
Nos. 25 and 26.	6.20 to 6.45
No. 27.	6.25 to 6.50
No. 28.	6.50 to 6.75
No. 29.	6.65 to 6.90
No. 30.	6.80 to 7.05
Tin-Mill Black Plate	
Nos. 15 and 16.	4.30 to 4.55
Nos. 17 to 21.	4.35 to 4.60
Nos. 22 to 24.	4.40 to 4.65
Nos. 25 to 27.	4.45 to 4.70
No. 28.	4.50 to 4.75
No. 29.	4.55 to 4.80
No. 30.	4.55 to 4.80
Nos. 30 $\frac{1}{2}$ and 31.	4.60 to 4.85

Metal Markets

The Week's Prices

Cents Per Pound for Early Delivery

	Copper, New York		Tin, New York	Lead, New York		Spelter, New York	
	Lake	Electrolytic		New York	St. Louis	New York	St. Louis
Feb. 28	36.50	36.50	50.75	9.75	9.62½	10.75	10.50
Mar. 1	36.25	36.25	51.50	9.50	9.50	10.87½	10.62½
2	36.25	36.25	53.50	9.50	9.50	10.87½	10.62½
3	36.25	36.25	54.00	9.50	9.50	10.87½	10.62½
4	36.25	36.25	54.00	9.50	9.50	10.87½	10.62½
5	36.25	36.25	54.00	9.50	9.50	10.87½	10.62½

Copper is quiet, with prices largely nominal to July 1. Tin is high because of apprehension over future arrivals. Lead continues strong despite more liberal arrivals from the West. Spelter consumers show a disposition to wait and meanwhile prices are sustained. The waiting attitude is characteristic of all the metals. Spot antimony is quiet but more interest is being shown in futures.

New York

Copper.—The market shows but little change. In a broad way quotations for deliveries this side of July are nominal, although a little is being done here and there for prompt and nearby metal. Spot electrolytic (and Lake also) ranges from 36.25c. to 36.50c.; April at 36c.; May at 35.50c.; June at 34c.; third quarter at 31.50c. to 32c., and last half at 30.50c. Business has been done a little above and a little below these prices, but they represent the average. Reports have been current that a large third-quarter business was being done, but this is denied in quarters where the truth should be known. It is not questioned, however, but that quiet negotiations have been under way for last-half copper for export. The London market for spot electrolytic is unchanged at £151 as compared with a week ago. The February exports totaled 24,937 tons.

Copper Averages.—The average price of either Lake or electrolytic copper for February, based on daily quotations in THE IRON AGE, was 34.90c.

Tin.—Fear that shipments from London and from the Far East may be interrupted has created a nervous and higher market. Spot Straits was quoted yesterday at 54c. and spot Banca at 52.50c., sale being made at these figures. Spot Banca was sold Feb. 28 at 49c. The nervousness referred to became conspicuous March 1, when prices advanced and showed a lack of uniformity. At the close of that day 52.50c. was paid for spot Straits. The market has appeared active, but probably not more than 200 tons changed hands. On March 3 a 5-ton lot of spot Straits was sold at 53c. on the Exchange. On March 5 there was fair inquiry, only about half of which resulted in business, one transaction involving April and May shipment from the East at 47c. Yesterday about 150 tons, mostly futures, was taken, May shipment from the East again bringing 47c. Deliveries into consumption in February were fair, amounting to 3930 tons, 680 tons of which came via the Pacific Coast. The quantity now afloat is 3566 tons.

Spelter.—March spelter ranges from 10.62½c. to 10.75c., St. Louis, with the New York quotation about ¼c. higher. April is quoted at 10.25c. to 10.37½c., St. Louis, and second quarter at 10c. to 10.12½c. The market is steady, but there is very little demand from consumers. Dealers have been the most active buyers of late, otherwise the market is a waiting one. Producers are of the opinion that the metal should be higher, or that the ore should be lower, as they do not now see a satisfactory margin of profit. Brass mill special is quoted at ½c. to ¾c. over prime Western. The February exports were large, amounting to 11,030 tons. The London quotation for spot yesterday, as compared with a week ago, was unchanged at £47.

Lead.—The American Smelting & Refining Company last Friday advanced its New York quotation \$10 per ton, or to 9c. per lb. The action had some effect

in bolstering up the opinions of hesitating consumers, but made little difference so far as prices are concerned, inasmuch as the bulk of the company's business is done on average-price contracts, and the independents already were selling at prices well over 9c. Spot lead is quoted at 10.50c. to 11c., while March ranges from 9.50c. to 9.75c. at both New York and St. Louis. Arrivals from the West are a little more liberal, but still far from what they should be. April is about 9.25c. to 9.50c., and May at 9c. to 9.25c. Practically all of the inquiry is for the near-by positions, futures being generally neglected. The February exports totaled only 430 tons. The London quotation for spot, as compared with a week ago, was unchanged at £30 10s.

Antimony.—Spot metal is quiet and somewhat easier at 30c. to 31c. for Chinese and Japanese grades. In futures some interest has been shown and those positions are strong. Dealers and importers are said to be trading heavily among themselves. March shipment from Japan was sold yesterday at 14.75c. c. i. f., New York.

Aluminum.—No. 1 virgin aluminum, 98 to 99 per cent pure, is stronger at 68c. to 60c. per lb.

Old Metals.—No weakness is yet seen. Dealers' selling prices are as follows:

	Cents per lb.
Copper, heavy and crucible	33.00 to 34.00
Copper, heavy and wire	32.00 to 32.75
Copper, light and bottoms	27.00 to 27.50
Brass, heavy	20.00 to 20.50
Brass, light	15.50 to 16.00
Heavy machine composition	26.00 to 26.50
No. 1 yellow rod brass turnings	20.00 to 20.50
No. 1 red brass or composition turnings	23.00 to 24.00
Lead, heavy	9.00
Lead, tea	8.50
Zinc	9.00

Chicago

MARCH 6.—Heavy purchases of copper by domestic interests are causing further advances in price. Tin quotations are also higher in view of the uncertainty of ocean transportation. We quote: Casting copper, 35.50c.; Lake copper, 36.50c.; tin, carloads, 55c., and small lots, 57c.; lead, 9.75c. to 10c.; spelter, 10.75c. to 11c.; sheet zinc, 21c.; Cookson's antimony, 50c.; other grades, 34c. to 35c. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 29c.; copper bottoms, 26c.; copper clips, 28c.; red brass, 25c.; yellow brass, 18.50c.; lead pipe, 8c.; zinc, 8c.; pewter, No. 1, 32c.; tinfoil, 40c.; block tin pipe, 45c.

St. Louis

MARCH 5.—Prices were strong all through the week. At the close today lead was quoted at 9.62½c. to 9.75c. and spelter 10.62½c. to 10.75c. in carload lots. In less than carloads: Lead, 11.50c.; spelter, 12c.; tin, 56c.; Lake copper, 38c.; electrolytic copper, 37.50c.; Asiatic antimony, 38c. In the Joplin district the top basis for zinc blende was \$90 per ton with the range down to \$80. Lead ore, despite predictions of a drop, remained firm at \$122.50. On miscellaneous scrap metals we quote dealers' buying prices as follows: Light brass, 12.50c.; heavy yellow brass, 14c.; heavy red brass and light copper, 20c.; heavy copper and copper wire, 23.50c.; pewter, 25c.; tinfoil, 35c.; lead, 6c.; tea lead, 4c.; zinc, 7c.

Taken Over by Alan Wood Iron & Steel Co.

The Alan Wood Iron & Steel Company, Philadelphia, has taken over the J. Wood & Brothers Company, Conshohocken, Pa., according to reports from the latter city. The Conshohocken concern, which is capitalized at \$400,000, was organized originally in 1832 and the plant has been rebuilt several times. It is a manufacturer of sheets and light plates and has an annual capacity of 20,000 tons. The Alan Wood Iron & Steel Company's leading products also are sheets and plates, of which it has an annual capacity of 60,000 tons. Its own plant is also located at Conshohocken.

Exports of Swedish purple ore, containing 0.30 per cent of nickel or over, has been prohibited since Jan. 14, 1917, says the London Ironmonger.

PERSONAL

L. P. Alford has resigned as editor of the *American Machinist* to establish himself in consulting engineering, and he has been succeeded by John H. Van Deventer, managing editor of the *American Machinist*, and identified with that publication for the last thirty months.

W. S. Pilling of Pilling & Crane, Philadelphia, has gone to California for a stay of several weeks.

Alva C. Dinkey, first vice-president Midvale Steel & Ordnance Company, has been appointed one of a committee of five by the Philadelphia Chamber of Commerce to co-operate with the quartermaster's department in the purchase of army supplies in case of war.

Fred Humphrey, who has been president of the Humphrey & Sons Company, Joliet, Ill., and eldest son of the founder of the business, has retired from its management and is succeeded by his nephew, Harry Humphrey, who will be president of the company.

R. L. Slocum has been appointed assistant superintendent of mill No. 5 of the Universal Portland Cement Company at Universal, Pa., succeeding R. F. Knoth, deceased. Mr. Slocum was graduated from Pennsylvania State College in 1905 and has been with the Universal Portland Cement Company in the department of building construction and machinery installation for 10 years.

James B. Pauley, associated with the International Harvester Company, Chicago, in manufacturing, sales and purchasing departments for the past 12 years, has resigned to become vice-president of the J. K. Deering Coal Company, 1914 McCormick Building. For six years Mr. Pauley represented the International Harvester Company in Europe, going over to build its French works and remaining to give attention to the wider interests of the company in Russia, Germany, Sweden and Austria-Hungary.

T. I. Crane of Pilling & Crane, Philadelphia, has spent February at Ormond and other Florida points.

C. F. Westing, recently connected with the Eddystone plant of the Remington Arms Company as assistant purchasing agent, has been appointed purchasing agent of the Gamewell Fire Alarm Telegraph Company, Newton Upper Falls, Mass.

At the recent annual meeting of the Bristol Brass Company, Bristol, Conn., the following officers were elected: Albert F. Rockwell, president; Pierce N. Welch, vice-president; Julian R. Holley, secretary and treasurer; A. D. Wilson, cashier; A. B. Seelig, general manager; John F. Wade, works manager. Mr. Seelig was formerly connected with the sales department of the Chase Rolling Mills, Waterbury, Conn.

At the regular annual meeting of the Fisher Tool & Supply Company, Detroit, Roy Fisher was elected president; Ralph Hoagland, vice-president and sales manager, and Herman Fisher, secretary and treasurer.

William Smith, formerly general master mechanic of the Pennsylvania Steel Company, has been appointed general master mechanic of the Worth Brothers Company branch of the Midvale Steel & Ordnance Company, located at Coatesville, Pa.

The Frost Gear Company, Jackson, Mich., held its annual meeting recently. The sales for the past year were \$1,246,000. E. E. Frost was elected president, M. C. Townley, vice-president; Robert Smith, secretary, and A. S. Glasgow, treasurer.

O. M. Stowe, treasurer and purchasing agent of the D. M. Sechler Implement & Carriage Company, Moline, Ill., has severed his connection with that company after being in its service 10 years. For eight years he had charge of collections and finances and for the past two years was purchasing agent. His plans for the future have not been fully developed.

W. E. Wolfram, for the past 11 years superinten-

dent of the projectile department of the Bethlehem Steel Company, has severed his connection with that company and will leave shortly on a three months' trip to the Pacific coast.

August Heckscher, New York, is spending the winter at Mountain Lake, Florida.

W. L. Hoffman, formerly Philadelphia manager for Hickman, Williams & Co., has been appointed district sales manager in the Philadelphia territory for the Brier Hill Steel Company, Youngstown, Ohio.

F. George Walker, former branch manager of the Raybestos Company, has tendered his resignation and is now president of the Walker Joint Company, manufacturer of the Walker universal joint, with offices at 1613 Dime Bank Building, Detroit.

J. W. and E. M. Johnson of Isaac G. Johnson & Co., Spuyten Duyvil, N. Y., have returned from an absence of some weeks in Florida.

J. P. Van Gelder of J. P. Van Gelder & Co., Sydney, Australia, has been for some time in St. Louis, engaged in the purchase of machinery, including grain-milling equipment, box and bag machinery, coffee roasters, elevators, etc.

Prof. John F. Keller, instructor in the forging and heat treatment of metals, Purdue University, Purdue, Ill., addressed the Steel Treating Research Club of Detroit, March 7, 1917, on "Steel, Its Selection and Treatment; the Spark Method of Selecting Steel for Industrial Purposes."

W. C. Wright, formerly representing the Pennsylvania Steel Company in northern Ohio territory and recently connected with the Cleveland office of the Bethlehem Steel Company in charge of its track equipment department, has resigned to become connected with the Read-Rittenhouse Company, Philadelphia, Pa.

J. D. Cox, president and general manager Cleveland Twist Drill Company, Cleveland, has gone to Pasadena, Cal., where he will remain until about April 1.

Fred W. Steinen, for many years connected with Corrigan, McKinney & Co., Cleveland, has resigned. He will devote his time to personal affairs and may engage in business in Cleveland. He has been succeeded by A. J. Sweeney, who has been his assistant.

R. B. Sheridan, president, and Charles E. Carpenter, vice-president, Allied Machinery Company of America, subsidiary of the American International Corporation, sailed for Vigo, Spain, March 2 on the steamship Alfonso XII. They will visit the company's various offices in Europe, particularly the one at Paris.

Among the changes announced in the passing of the American Iron & Steel Mfg. Company's interests at Lebanon and Reading, Pa., to the Bethlehem Steel Company on March 1 at Philadelphia was that of John Penn Brock to be general manager of the Lebanon plant. Mr. Brock was formerly vice-president of the American Company. J. V. Culliney, for 16 years superintendent of the factories, resigned and goes to the Penn Iron Company, at Lancaster. His place is filled by Jacob Swayze of Reading. Announcement also is made of the resignations of H. C. Gable as general sales agent and Thomas H. Brenholtz as master mechanic.

The Middletown Car Works, Middletown, Pa., has elected J. N. Hansen of Pittsburgh as president of the company. He succeeds the late Arthur King.

Alba B. Johnson, president Baldwin Locomotive Works, Philadelphia, has been elected president of the Pennsylvania Chamber of Commerce.

Ferdinand W. Roebbing, head of the John A. Roebbing's Sons Company, Trenton, N. J., was tendered a dinner by the Lotus Club of Trenton, Feb. 28, in honor of his seventy-fifth birthday. Owing to illness, Mr. Roebbing was unable to be present and was represented by Fred Dixon of New York, one of his associates. Former Governor E. C. Stokes acted as toastmaster.

Richard P. Tell, vice-president and general manager National Brake & Electric Company, Milwaukee, has been advanced to the position of president, succeeding John S. Miller, president Westinghouse Air Brake Com-

pany. Mr. Tell is succeeded as general manager by W. L. Reid, until now manager of the Schenectady works of the American Locomotive Company, who took charge March 5.

W. H. Keller, Fond du Lac, Wis., was re-elected president of the Keller Pneumatic Tool Company, Fond du Lac and Grand Haven, Mich., at the annual meeting. W. H. Loutt, Grand Haven, was elected vice-president, and Arnold Petri was re-elected secretary-treasurer. The offices and main works will be moved to Grand Haven about July 1, upon the completion of a new shop group now under construction. The Fond du Lac plant will be continued as a branch, temporarily, at least.

Cass L. Kennicott, for some years identified with the water softening business, has become associated with the Permutit Company and is in charge of that company's Chicago office in the Continental and Commercial Bank Building, 208 South La Salle Street.

Lawford H. Fry, superintendent of product, Standard Steel Works Company, Burnham, Pa., delivered an illustrated lecture on "Steel, Some of Its Constituents and Some of Its Properties," before the Mining Society of the Pennsylvania State College, State College, Pa., on Wednesday evening, Feb. 28.

Oskar Kylin, now chief engineer of the Foster Machine Company, Elkhart, Ind., has designed a universal turret lathe, which has been put on the market by that company.

Frank L. Driver, president Driver-Harris Wire Company, Harrison, N. J., has returned from a trip to England, where a branch of the company has been established at Manchester.

J. Wilson Bayard has succeeded Charles D. Norton, resigned, as a member of the board of directors of the Baldwin Locomotive Works, Philadelphia. The other directors of the company have been re-elected, namely, William L. Austin, William Burnham, Alba B. Johnson, Samuel McRoberts, Samuel M. Vauclain, Francis M. Weld, Samuel F. Pryor, Guy E. Tripp, William E. Corey, Sydney F. Tyler and Sydney E. Hutchinson.

B. E. V. Luty, Pittsburgh, has just celebrated his first quarter century in iron trade journalism. He started as "mechanical editor" of the *American Manufacturer and Iron World* at Pittsburgh under the editorship of Dr. Joseph D. Weeks, and has since been a constant editorial and market news writer. He has been a contributor to THE IRON AGE since 1902.

George McAninch, assistant secretary of the Simplex Automobile Company, New Brunswick, N. J., has resigned to become effective at an early date.

Charles M. Wales, agent for the Otis Steel Company, 11 Broadway, New York, has also engaged to take care of forging business for the Allis-Chalmers Mfg. Company, which has become equipped to handle heavy work and has increased its capacity 50 per cent.

Edward L. McIlvain, until recently president of the Lehigh Coke Company and formerly president of the Bethlehem Steel Company, has opened an office at 120 Broadway, New York City.

D. V. Sawhill, for some years connected with the Pittsburgh sales office of the Youngstown Sheet & Tube Company, has resigned to take charge of sales of tubular products of the Cincinnati Iron & Steel Company, Cincinnati, effective April 1. He has been succeeded by George E. Price, who has been connected with the Pittsburgh office of the Sheet & Tube Company for several years.

W. C. Coffin, vice-president and sales manager Knox Pressed & Welded Steel Company, Pittsburgh, is taking a vacation at Ormond, Fla.

The annual sales convention of the Independent Pneumatic Tool Company, Aurora, Ill., was held Feb. 28 and March 1, at Aurora and Chicago respectively. The first day was spent in the company's factory where the sales force was instructed in the methods and equipment involved in manufacturing the products it is asked to sell. Discussion of selling methods occupied the second day's session.

Clinton Company Reorganized

The Clinton Wire Cloth Company, Clinton, Mass., established in 1846, incorporated in 1856 and reorganized in 1866, has again been reorganized, with capital of \$2,500,000, consisting of \$1,000,000 common stock and \$1,500,000 of 6 per cent preferred stock. All the former owners have retired from the company with the exception of the Fairbanks and Stodder interests. The new officers are: Stuart W. Webb, president; Charles F. Fairbanks, treasurer. These officers together with the following constitute the new board of directors: Rowland W. Boyden, Wallace B. Donham, Hermann F. Clarke, all of Boston, and George T. Stodder of Bangor, Me. Mr. Webb will assume charge of the manufacturing and Mr. Fairbanks will direct the financing and sales.

The company will continue to produce the lines of structural products and wire cloths for which it has won a high reputation here and abroad. One of the early developments will be the establishment of a plant in the Middle West to better serve its Western customers. Manufacturing facilities at the main plant at Clinton, Mass., will be largely extended and an aggressive sales and manufacturing policy will be inaugurated. The list of products of the company, which has been constantly expanding in the past, will be still further enlarged. It is placing on the market a new brand, the Pilgrim, of wire cloth in the hardware grades which is galvanized after weaving by a new process developed and patented by the company and for which many points of superiority are claimed.

The principal office of the company will continue to be maintained in the Sears Building, Boston, and nearly the entire eleventh floor of the Flatiron Building, New York, is to be occupied shortly as a sales office. Albert Oliver & Son will be sole sales agents for structural products in the territory east of the Rocky Mountains with headquarters at New York. Royal D. Bradbury, well known as a consulting engineer in structural engineering, will become manager of sales of structural products and will devote some of his time to the further development of this line.

Advances and Strikes

The Shepard Electric Crane & Hoist Company, Montour Falls, N. Y., has announced an increase in the hourly rate of wages of 10 per cent., effective April 1, for all shop workmen, construction gangs and laborers. On the same date the working day will be reduced from 10 to 9 hr., and the half holiday on Saturday maintained as heretofore, making a 50-hr. week.

The Underwood Typewriter Company, Hartford, Conn., announces a 10 per cent raise for all of its factory employees. The raise is to be temporary but will continue until further notice.

The Philadelphia Boiler Works, Philadelphia, Pa., has granted a 10 per cent increase in wages.

All shop employees at the repair shops of the Philadelphia & Reading Railroad Company, at Reading, Pa., have been granted an advance of 2c. per hr. to skilled mechanics and 1c. to unskilled labor.

A strike of the entire foundry force of Maher & Flockhart, Newark, N. J., was declared Feb. 26. A demand was made that the molding machine operators be recognized as members of the union, with its \$4 minimum wage. When the firm employed a non-union operator and refused to consider the union terms, the strike was called. Non-union foundrymen have been employed and the firm declares the policy of open shop for the future. Since the Maher & Flockhart foundry is the largest in the vicinity, both the founders and the union look upon this strike as a test case.

The E. S. Cullen Machinery Company, Leader-News Building, Cleveland, which was formed on Dec. 1 by the merging with it of the C. W. Cullen Machinery Company, will in the future be known as the C. W. Cullen Machinery Company. This change in name follows the recent death of E. S. Cullen. The business will now be conducted by his brother, C. W. Cullen.

OBITUARY

WILLIAM CLATWORTHY, of Taunton, Somerset County, England, died March 2 at the Murray Hill Hotel, New York City, where he had resided for the past 25 years, after an illness of several months. He was 78 years old. He came to America when a young man, and was associated in business with Charles Peace, who was the sole agent in the United States for Joseph Rodgers & Sons, Ltd., Sheffield, England. When Mr. Peace retired, the agency was taken over by Mr. Clatworthy and his brother Frank, who conducted it for many years under the name of F. & W. Clatworthy. During his business career, William Clatworthy's sterling character won for him a place in the hearts of buyers of cutlery throughout the United States, and, although he retired in 1891, there are many of his old friends still left in the trade who will learn of his death with sorrow.

COL. WALTER KATTE, prominent in railroad and bridge construction, and chief engineer of the Second and Ninth Avenue elevated roads, New York City, died at his home in that city March 4, aged 88 years. He was born in London, Eng., was educated in King's College, and came to the United States in 1849. He had charge of the construction of the Eads Bridge over the Mississippi River at St. Louis, spent 10 years in railroad work with the Pennsylvania Railroad, and at various times served as chief engineer of the Ontario & Western, New York Central and West Shore railroads. In the Civil War he served as constructing engineer for military bridges and railroads. He was a member of the Society of Civil Engineers and one of the founders of the Western Society of Engineers. He leaves his widow, a daughter and two sons.

OTTO RUDD, second vice-president and general manager Simmons Company, Kenosha, Wis., died at the Mayo Hospital, Rochester, Minn., March 2, aged 48 years. Mr. Rudd only recently had been promoted to the general management of the company, in recognition of his genius in the development of tubing for the manufacture of beds and as a production expert. He was born in Sweden, and came to America when 18 years old, beginning his career as a track laborer in Minnesota. He entered the employ of Z. G. Simmons, brass bed manufacturer, at Kenosha, as a common laborer, and at his death was in receipt of a salary of \$25,000 a year. He leaves his widow and two daughters.

HENRY CLAY THOMPSON, vice-president Buck's Stove & Range Company, St. Louis, died Feb. 26 at Mineral Wells, Tex., aged 70 years, after an illness which seized him last November. He was a veteran of the Civil War, serving in a Wisconsin regiment. At the close of the war he became connected with the wholesale hardware house of Jewett & Butler, Chicago, but removed to St. Louis in 1873, to become associated with the Excelsior Mfg. Company, remaining until 1883, when he went to Memphis to manage the H. Wetter Mfg. Company. He returned to St. Louis in 1907 to become an officer of the Buck's company. He leaves his widow and two sons.

ALBERT C. STEBBINS, vice-president Niles-Bement-Pond Tool Company, died Feb. 28 at his home in Plainfield, N. J., from pneumonia, aged 73 years. He was a native of Springfield, Mass. He removed to Plainfield from Worcester, Mass., with the Pond company, in 1887. He entered the employ of L. G. Pond, the organizer of the concern, when he was sixteen, and remained with the company up to the time of his death, rising step by step until he was given charge of the local plant and was made vice-president. He was also vice-president of the Dime Savings Bank of Plainfield.

JOHN F. ALDEN, special representative of the American Bridge Company at Rochester, N. Y., died in that city Feb. 27, aged 64 years. He had been connected with the steel industry for over 40 years. He built the suspension bridge over the Niagara River and other bridges of note in various sections of the country. At

one time he owned the Rochester Bridge Company and was part owner of the Lassig-Alden Bridge Company, Chicago. He was a graduate of Rensselaer Polytechnic Institute and was a direct descendant of John Alden, one of the pilgrims who came to America in the Mayflower.

EDGAR S. COOK, president Warwick Iron & Steel Company, Pottstown, Pa., died March 4 while seated on the porch of his home at Redlands, Cal., where he was in the orange-growing business with his son Harry. He was a native of Philadelphia and was 65 years old. He moved to Pottstown in 1877 as chemist and afterward becoming manager of the Warwick Iron Company. He retired from active business in 1912, when the Warwick Iron & Steel Company, of which he was president, leased its plant to the Eastern Steel Company. He leaves his widow and four sons.

JOSEPH HARRISON, for 27 years foreman of the foundries of the Allis-Chalmers Company, Milwaukee, died Feb. 27, aged 73 years. In recent years he had been associated with the Central Foundry Company, Milwaukee, retiring about five years ago because of advancing age. He was a native of Derbyshire, Eng., and came to America in 1866.

JOHN K. HOWE, iron manufacturer, Albany, N. Y., died suddenly at his home, March 4, aged 67 years. He was born at Troy, and was graduated from Yale in 1871. He was a member of the University Club of New York City, and founder of the Albany University Club.

Merger Proposed with Marlin Arms

Holders of the voting trust certificates representing the common shares of the Marlin Arms Corporation, which has its plant at New Haven, Conn., and its main office in New York, will meet in New York, March 14, to vote upon the purchase of the Standard Roller Bearing Company, Philadelphia, and the Rockwell-Drake Company, Plainville, Conn. It is reported that tentative arrangements have been made for the purchase of the assets of the Standard Roller Bearing Company for \$2,000,000 and 2000 shares (of no par value) of the new common stock of the Marlin Arms Corporation. The Rockwell-Drake Company will be absorbed under a similar arrangement calling for \$270,000 in cash and 1350 shares of common stock.

The Standard Roller Bearing Company, recently in a receiver's hands, but sold Feb. 27 to Frank Smith, representing a syndicate, is a large producer of ball bearings, roller bearings and wire wheels for automobiles. A recent audit showed a net asset value of over \$2,600,000. The Rockwell-Drake Company, which was started about two years ago and has grown rapidly since, is also a manufacturer of ball bearings. Albert F. Rockwell, president Marlin Arms Corporation, is a part owner in the Rockwell-Drake Company.

To carry the project through, it is proposed to issue \$1,500,000 two-year 6 per cent convertible notes. Consideration will also be given to a change of corporate name to one more indicative of the enlarged business. In the circular letter which has been issued to the members of the voting trust it is stated that the company wishes to extend business into a branch free from the risk of a munitions plant.

The Charles A. Strelinger Company, Detroit, started business in its new building at 43-52 Larned street, March 5. The new quarters comprise six stories and basement, built expressly for the machinery and tool jobbing trade, and constitute one of the most modern and fully equipped machinery supply establishments in the Middle West. Owing to the increased space now available, the company will carry on hand for immediate delivery every article and piece of machinery that the ordinary shop would need at short notice.

The De Laval Steam Turbine Company, Trenton, N. J., has opened a district sales office in the Smith Building, Seattle, Wash., in charge of William Pullen.

Pittsburgh and Nearby Districts

The Union Electric Steel Company, Pittsburgh, which is about to manufacture high-grade alloy steels in a Heroult electric furnace, will sell all its products for the first six months to the Alloy Steel Forging Company, Carnegie, Pa.

The manufacture of shells for the Allies has been resumed at the plant of the Standard Steel Car Company, Newcastle, Pa., after being stopped for several months. It is said the order is for many thousands of shells, and will keep the forge department of the plant busy for a considerable time.

The Huessener Engineering Company, Oliver Building, Pittsburgh, reports the following companies equipping their boilers with patent Bradshaw burners: Norton Iron Works, 8 boilers and 4 stoves; Central Iron & Steel Company, 4 boilers and 3 stoves; Columbus Iron & Steel Company, 5 boilers; Ashland Ore & Mining Company, 3 boilers.

A company has been organized to incorporate as the Warren Electric Steel Company, Warren, Pa. It is now receiving bids for plant and equipment for the manufacture of high-grade electric steel castings. The company's offices are at 101 Liberty Street, Warren, Pa. Reese T. Harris is general manager.

The new Haws Refractories Company, Johnstown, Pa., will build a new brick manufacturing plant at Lewistown Narrows, to cost about \$250,000. The plant will have a capacity of 80,000 brick per day, and is expected to be placed in operation about May 1.

The Pittsburgh office of the Buffalo Forge Company, Buffalo Steam Pump Company, and Carrier Air Conditioning Company, located for some years in the House Building, will be removed April 1 to the New Union Arcade, the office building owned by H. C. Frick. H. Lee Moore continues in charge.

The Standard Engineering Company, Park Avenue and Second Street, Ellwood City, Pa., manufacturer of machinery, will build a large addition to its plant. Contract has been placed for over 500 tons of structural steel for erection.

The Acme Steel Company, Glassmere, Pa., has been incorporated, with a capital stock of \$200,000. The incorporators are George H. McFetridge, Aspinwall; John J. Rattigan, Homestead; J. Frank Pepper, Tarentum; Thomas B. Hepler, Tarentum, and Paul Newcomer, Pittsburgh.

Two new hot sheet mills are being added to the plant of the Western Reserve Steel Company, Niles, Ohio, which is owned and operated by the Brier Hill Steel Company.

The National Tube Company, Lorain, Ohio, announces that on and after May 6 its plant there will be operated on Eastern time.

The Valley Mold & Iron Company, which will build a new plant beside Ella furnace at West Middlesex, Pa., to make ingot molds, will erect two steel buildings, each about 100 x 150 ft., to house the equipment. One of these buildings has already been bought from the Tidewater Steel Company, Chester, Pa. Hot metal will be used in making the molds, to be furnished by Ella furnace, owned by E. W. Mudge & Co., Frick Building, Pittsburgh.

In connection with the new Eliza 500-ton blast furnace to be built by the Jones & Laughlin Steel Company, Pittsburgh, this company is also building six 50-ton open-hearth furnaces at its Soho works in Pittsburgh. The company started work some time ago on three furnaces of this size, but later decided to add more. Much of the increased output of steel will be needed for the new 128-in. plate mill being installed at the Soho works, and which will be in operation some months from now.

The name Sharon Steel Company has been decided upon for the new holding company which will own and operate the plants of the Sharon Steel Hoop Company and the Youngstown Iron & Steel Company. It is said that some changes among officials of both concerns will be made as a result of the merger.

Naylor & Co., iron and steel merchants, New York

City, will open an office about April 1 on the seventh floor of the new Frick Arcade Building, Fifth Avenue, Pittsburgh.

The Westinghouse Electric & Mfg. Company, East Pittsburgh, will likely close in the near future for over 200 large machine tools and about 50 electric cranes of various capacities for its new plant at Essington, Pa.

Hubbard & Co., Pittsburgh, are in the market for a portable motor-driven shear, 440-volt, 3-phase, 60-cycle alternating current.

American Iron and Steel Institute Meeting

The twelfth general meeting of the American Iron and Steel Institute will be held at the Waldorf Astoria Hotel, New York City, on Friday and Saturday, May 25 and 26.

At the last meeting of the board of directors of the Institute, the chairman, Judge E. H. Gary, was presented a rocker blotter and a seal to be used in connection with the magnificent gold inkstand presented to him at the meeting of the Institute last October in St. Louis. The presentation speech was made by Joseph G. Butler, Jr., of Youngstown, and Judge Gary responded briefly, expressing his deep appreciation of the continued manifestation of good-will on the part of the members of the Institute. Every part of the rocker blotter except the blotter itself is of solid gold. It has a turned knob-shaped handle engraved with the monogram "E. H. G." The handle of the seal is also of gold and the seal itself is cut with the full arms of Judge Gary.

Dodge Purchase of Steel Pulley Companies

The Dodge Mfg. Company, Mishawaka, Ind., announces the acquisition of properties and products of the Oneida Steel Pulley Company and the Keystone Steel Pulley Company of Oneida, N. Y. The Dodge Steel Pulley Corporation was formed to control the two Oneida companies and will be a subsidiary of the Dodge Mfg. Company. The new corporation has been authorized to increase its capital stock from \$550 to \$550,000, resulting in an increase of shares of from 10 to 10,000. The sale and distribution of products of the corporation will be under the supervision of the Dodge Sales & Engineering Company, Mishawaka, Ind. Plans for the new corporation will be completed this week.

Chain Prices Advance

Effective Thursday, March 1, prices on chain were advanced. Makers report the demand heavy, and their output sold up for three months or longer. The new prices now in effect on common proof-coil chain are as follows: 3/16-in., \$10.60; 1/4-in., \$8.05; 5/16-in., \$7.05; 3/8-in., \$6.50; 7/16-in., \$6.35; 1/2-in. and 9/16-in., \$6.20; 5/8-in. and 11/16-in., \$6.10; 3/4-in. and 13/16-in., \$6; 7/8-in. and 15/16-in., \$5.90; 1-in., \$5.80; 1 1/16-in., 1 1/8-in., and 1 1/4-in., \$5.90. The extras have also been changed, and are now as follows: 3/16-in. and 1/4-in., B. B., \$1.50 extra; 5/16-in. and 3/8-in., B. B., \$2 extra; 5/16 and larger, B. B., \$1.25 extra; and 5/16-in. and larger, B. B., \$1.75 extra.

Locomotive Orders

Orders for locomotives in the last week have been 46. The American Locomotive Company will build 30 for the Chicago, Rock Island & Pacific and 16 for the Union Pacific. It is estimated that orders in February amounted to 299 which, with the 807 credited to January, make 1106 for the first two months of the year. Of these domestic orders call for 839 locomotives.

National Metal Trades Convention

The National Metal Trades Association will hold its next convention at the Hotel Astor, New York City, on April 25 and 26. As usual, the meeting will be preceded by a session of the Administrative Council of the association on the day before the convention opens.

Machinery Markets and News of the Works

EXPORT TRADE EASES OFF

Solution of U-Boat Menace Awaited

Domestic Business Good—Railroad Situation Still Bad—Further Price Advances Expected—Russian Agent for Canada

Despite disorganized traffic conditions, the unsettled shipping problem and lesser distractions, the machine-tool market shows plenty of life and little weakness. Exporters at New York are now cautious in placing orders with tool builders and are not discounting the possibilities of serious interference with cargoes. In Chicago foreign business is slowly declining.

All important centers report an attractive local trade. In some directions, however, orders are being placed rather slowly. Foundry equipment is the feature of business at Chicago.

Further advances in the prices of machine tools are predicted from Cincinnati on account of the increased cost of castings, tool steel, labor, etc. They have already been put into effect at San Francisco, but have not created any comment and did not affect sales.

The Firestone Tire & Rubber Company, Akron, Ohio, has a list out for 34 tools and the Cincinnati Grinder Company is seeking 10 tools.

Railroad congestion is still a major factor in disturbing the trade. It has enabled dealers at Chicago, however, to divert tools to their western customers. At Cleveland embargoes are interfering with shipments and are preventing dealers from getting deliveries on stock orders. Foundries at Milwaukee complain of a coke shortage. At Detroit the freight situation has eased off and manufacturers are now going ahead with plant extensions.

The Russian Government has appointed a special purchasing agent in Canada. This move is considered in Toronto a distinct asset for Canadian business.

New York

NEW YORK, March 7, 1917.

The general state of the market continues good. In some directions orders are being placed rather slowly, but the inquiries are piling up, and there can be no question but that a large volume of business is in prospect. One large dealer reports February to have been the best month, with one or two exceptions, in the history of his house. With some lines of tools buying would be more active were it not for the long deliveries involved, this being the case with boring mills, some makes of which cannot be shipped before November.

Some of the large exporters of machine tools continue to ship at a good rate to France and Italy, sending all the steamship lines will accept, but they admit that they are apprehensive over the future, and for this reason are cautious in placing orders with machine-tool builders. Practically nothing is going to Russia. One of the largest exporting companies with offices abroad reports that sales are growing rather than diminishing. Dealers are selling less for export, but are doing a good scattering domestic business.

The S K F Ball Bearing Company, Hartford, Conn., is inquiring for 10 single-spindle automatic screw machines, with spline milling attachment, for making screws up to $\frac{3}{4}$ in. The machines are to be boxed for export.

The Niles-Bement-Pond Company, 111 Broadway, New York, will break ground April 1 for the erection of a new two-story office building, 80 x 125 ft., at its Pond Works at Plainfield, N. J., and for an extension to the new shop building which it completed Jan. 1, 75 x 300 ft., 50 ft. high. Both the buildings, that just completed and that just begun, will be used entirely for erecting lathes and planers and the space in the former erecting shop thus released will be devoted entirely to manufacturing. The Burke property recently acquired, which lies between the end of its shop and the Grant Avenue Station of the Central Railroad of New Jersey, will be used as a further shop extension and for a shipping and boxing department for the machine shop. It is probable that a decision as to the kind of buildings to be erected for these uses will be decided upon within a few days.

Thornton W. Price, 233 Broadway, New York, engineer, has plans in progress for a one-story brick foundry, 60 x 240 ft., for the Coldwell Lawn Mower Company, Newburgh, N. Y. A railroad siding on a 400-ft. trestle and reinforced concrete storage facilities for raw materials are also included. He will have entire charge of the purchase of both building materials and foundry equipment.

The Globe Woven Belting Company, Buffalo, N. Y., has increased its capital stock from \$50,000 to \$100,000 to provide increased productive capacity.

The W. W. Babcock Company, Bath, N. Y., manufacturer of butter churns, etc., has increased its capital stock from \$10,000 to \$50,000, and has distributed the new stock equally among the present stockholders. The increase was to provide capital to meet its expanding business. The officers, president, W. W. Babcock; vice-president, E. K. Derick, secretary, W. H. Craig, and treasurer, W. B. Hamilton, who with Thomas Saxton make up the board of directors, remain in active charge of the business.

The Columbia Machine & Stopper Company has been incorporated with a capital stock of \$50,000 and has taken over the business of the Columbia Machine & Stopper Corporation, 414 West Thirty-eighth Street, New York.

Charles G. Robin, Inc., 48 Warren Street, New York, incorporated last August with a capital stock of \$10,000, has established a plant for the manufacture of electrical supplies, such as conduit fittings, porcelain covers, etc.

The Hammond Steel Company, Syracuse, N. Y., manufacturer of tool and alloy steels, has just let contract for large additions to its recently built hammer shop. Gaggin & Gaggin, Syracuse, are the architects.

Krauter & Co., Inc., manufacturer of drop forgings, 563 Eighteenth Street, Newark, N. J., wants an upsetting or bulldozing machine of 1-in. capacity.

The Acorn Screw Company, 826 Boulevard, Bayonne, N. J., will purchase a 16 to 24-in. shaping machine, a 1½-in. universal milling machine and an 18 to 24-in. swing lathe. single pulley drive preferred.

The Star Expansion Bolt Company, 149 Cedar Street, New York, is in the market for a forming machine for rolling special shape sheet metal strips 1/16 in. thick, 3 to 4 in. wide, 8 to 10 ft. long; also for one multiple sheet metal slitting machine to take standard sheets and with adjusting cutters for ½-in. widths and upward.

The Friend Mfg. Company, Gulfport, N. Y., manufacturer of spraying machinery, has increased its capital stock from \$50,000 to \$300,000.

The City of New York, Burdette G. Lewis, commissioner of corrections, Municipal Building, New York, is to erect an industrial building at New Hampton, N. Y., two stories, to cost \$60,000; also a power house, laundry and stores, one story and basement, to cost \$160,000.

The Simonds Mfg. Company, Lockport, N. Y., manufacturer of planer knives, edge tools, etc., has let contract for an addition to its steel plant on Ohio Street.

The Premier Machine Tool Works, Albany, N. Y., has filed articles of incorporation, with a capital stock of \$25,000, to manufacture steel, metals, etc. The incorporators are G. W. Long, J. J. Fisher and C. A. Simmons.

The plant of the International Paper Company, Watertown, N. Y., was damaged by fire recently to the extent of \$100,000.

The Loomerson Mfg. Company, Utica, N. Y., has been

incorporated with a capital stock of \$30,000 to manufacture machines and tools. A. J. Emerson, J. M. and C. J. Marston, 508 Second Street, are the incorporators.

The factory building to be erected by the Jamestown Auto Parts Mfg. Company, Jamestown, N. Y., will be 80 x 127 ft., two stories. Oscar Lenna is president.

The North West Brass & Aluminum Company, Rochester, N. Y., will build a two-story addition, 51 x 70 ft., to its foundry. George Hetzler is manager.

The Atlas Crucible Steel Company, Dunkirk, N. Y., has plans completed for an electrical building, 69 x 100 ft., also for a one-story addition to its gas producer building. J. H. Hegeman is manager.

Carl H. Page & Co., Inc., Albany, N. Y., has been incorporated to manufacture automobiles, motor cars and electrical and mechanical appliances. C. H. Page, P. C. Baer and I. H. Levy, 135 West Seventy-ninth Street, New York, are the incorporators. The capital stock is \$15,000.

The Emerson Motor Company, Kingston, N. Y., has completed plans for a molding room, 100 x 200 ft., one story, which it will erect at a cost of \$20,000.

The Heller Brothers Company, 879 Mount Prospect Avenue, Newark, N. J., manufacturer of rasps and files, will make extensions to its plant to cost about \$13,750.

The Trautz Company, 9 Delancey Street, Newark, N. J., metal refiner, will build a one-story brick addition, 50 x 84 ft., to its plant.

The Board of Freeholders, Newark, N. J., will receive bids until 2 p. m., March 13, for boilers and equipment at Overbrook Hospital. Plans and specifications have been prepared by Runyon & Carey, consulting engineers, 845 Broad Street.

The General Electric Company, East Orange, N. J., has filed plans for an addition to its lamp works at Springdale Avenue and North Eighteenth Street, of brick and reinforced concrete, three stories, 94 x 138 ft., with wing 28 x 39 ft., estimated to cost \$80,000.

The American Type Founders Company, Monitor and Maple streets, Jersey City, N. J., manufacturer of printers' type, has acquired property, 105 x 125 ft., adjoining its plant for extensions.

The No-Glare Starlight Company, Jersey City, N. J., has been incorporated with a capital of \$50,000 to manufacture headlights. C. B. Mears, William H. Dickinson and C. McKeever, Johnson Avenue and Grand Street, are the incorporators.

Jeremiah O'Mahony, 49 Lexington Avenue, Bayonne, N. J., manufacturer of wagons, has commenced the erection of a one-story wagon works at Third Street and Boulevard, to cost about \$8,500.

The Du Pont Fabrikoid Company, Wilmington, Del., manufacturer of artificial leather, has acquired the plant of the Marokene Company, Grove Street, Elizabeth, N. J., manufacturing a similar product. It is reported that improvements will be made. R. B. Heyward is superintendent.

The Loyal T. Ives Company, 19 Water Street, New Brunswick, N. J., manufacturer of knitting machine needles, will build a four-story, reinforced-concrete and brick addition to its plant, 25 x 50 ft.

Efficient Contractors, Inc., Perth Amboy, N. J., has been incorporated with a capital of \$25,000, to engage as machinists and machine contractors. Robert T. McMurray, 173 Smith Street, Harry McMurray and Henry Selden are the incorporators.

The Roessler & Hasslacher Chemical Company, 52 Fayette Street, Perth Amboy, N. J., has filed plans for a further extension to its plant at Rector and Front streets. It will be three stories, 100 x 426 ft., and is to cost \$180,000.

The Bethlehem Steel Company, South Bethlehem, Pa., has awarded a contract for the erection of a new power station and coal trestle at its limestone quarries, McAfee, N. J., to cost \$35,000. The power plant will be one story, of steel and reinforced concrete, 40 x 75 ft.

The McIntosh & Seymour Company, Orchard Street, Auburn, N. Y., manufacturer of steam engines, has awarded a contract to the Lackawanna Bridge Company, for the erection of a new machine shop.

New England

BOSTON, MASS., March 5, 1917.

The F. B. Shuster Company, New Haven, Conn., will build a two-story addition, 45 x 50 ft.

The New Britain Machine Company, New Britain, Conn., has awarded a contract for a two-story addition to an existing factory, 55 x 380 ft., with wing 40 x 50 ft.

Robert H. Ingersoll & Brother, Waterbury, Conn., have purchased two pieces of land on West Dover Street from the

American Brass Company on which it is planned to erect an office and factory building.

The New London Broaching Machine Company has been incorporated at Augusta, Me., with an authorized capital of \$60,000.

The Hendey Machine Company, Torrington, Conn., has increased its capital stock from \$900,000 to \$1,200,000.

The General Electric Company, Pittsfield, Mass., is having plans drawn by its architect for an addition to its foundry.

The Automobile Snow Attachment Company, Fryeburg, Me., has been incorporated with a capital stock of \$500,000 by Walter D. H. Hill, president; Charles W. White, treasurer; and Hugh W. Hastings, clerk.

The Conner Implement Company, Somerville, Mass., has been incorporated with a capital of \$50,000 to manufacture farming implements, motor vehicles, etc. The directors are A. R. Conner, president; George H. Moore, 22 Robinson Street, treasurer; and W. H. Bullard.

The National Machine Company, Hartford, Conn., has issued additional stock to the amount of \$29,950.

G. Haarmann & Co., Inc., Holyoke, Mass., contemplate the erection in the spring of an addition to its factory on Commercial Street.

The Gibby Foundry Company, East Boston, Mass., bought at auction, Feb. 27, the main foundry plant of the Smith & Anthony Company, Wakefield, Mass. The Barstow Stove Company, Providence, R. I., prior to the auction, bought at private sale the patterns, goodwill and the right to manufacture Hub stoves and ranges. The Barstow Stove Company announces that W. B. Hathaway, formerly president of the Smith & Anthony Company, will be made an officer.

The Scovill Mfg. Company, Waterbury, Conn., is having plans prepared for an office building to be erected on East Main Street.

Philadelphia

PHILADELPHIA, Pa., March 5, 1917.

The Baldwin Locomotive Works, Philadelphia, following the completion of its contract for 12-in. shells for the Allies, laid off about 1800 workmen March 2 at its plant at Twenty-sixth Street and Pennsylvania Avenue. It is reported that another 500 will be dropped at the end of the month and in a few months a final 1000, at which time its foreign shell contracts will probably be finished.

The Exeter Machine Works at West Pittston, Pa., bankrupt, was sold March 1 to a committee representing the bondholders at their holdings of \$175,000, plus the interest and the cost of the sale. The total sale price was \$186,666.67. The sale is subject to confirmation of the United States District Court. The sale includes all the property and the buildings and machinery, but does not include the contracts, the raw materials and the supplies. The business will be continued by the bondholders. Since the company went into the hands of receivers and the receivers have been operating it the business has been profitable.

The American Engineering Company, Aramingo and Cumberland streets, Philadelphia, is in the market for two 36-in. vertical two-head boring mills and one 48-in. x 48-in. x 18-ft. planing machine.

The N. & G. Taylor Company, 300 Chestnut Street, Philadelphia, is seeking a 15-ton standard gage 8-wheel locomotive crane for use with electromagnet, Orton & Steinbrenner type preferred.

The Benjamin Iron & Steel Company, South Pine and Buttonwood streets, Hazleton, Pa., manufacturer of steam shovels, stripping and mine cars, etc., has changed hands and been reorganized. The Benjamin interests have been bought out by Charles E. Butler, who has been elected president and general manager. Lafayette L. Butler has been made vice-president and assistant general manager. W. C. M. Butler, treasurer, and Robert E. Butler, secretary. On the new plant nothing at present is being done, and for just what purpose it will be utilized has not been decided by the board of directors.

The Atwater Kent Mfg. Works, 4937 Stenton Avenue, Philadelphia, manufacturer of ignition apparatus and automobile parts, has received bids for a one-story brick and concrete addition, 146 x 230 ft., to its plant at Wayne Junction.

The Ketterlinus Lithographic Mfg. Company, Fourth and Arch streets, Philadelphia, will build an addition to its boiler plant, to cost about \$9,400.

The Never Leak Flush Tank Company, Philadelphia, has been incorporated at Dover, Del., with a capital of \$125,000, by Charles H. Jones, W. I. N. Lofland and George W. Morgan, Dover.

Herman Winterer, Philadelphia, has awarded contract for a one-story brick machine shop, 70 x 114 ft., at 943-53 North Front Street, to cost \$31,000. Stewart Brothers, 2528 North Orkney Avenue, are the contractors.

The Charles F. Daiz Company, 432 North Fifth Street, Philadelphia, manufacturer of packing boxes, has taken bids for a two-story brick and concrete addition to its plant.

Caskey & Keen, Philadelphia, have been incorporated with a capital of \$100,000, to manufacture machinery. William J. Stern, Philadelphia, is the principal incorporator.

The Theodore Presser Company, 1712 Chestnut Street, Philadelphia, will build a power house, 70 x 70 ft., at its printing plant at Yeadon.

The Bailey, Banks & Biddle Company, 1228-32 Chestnut Street, Philadelphia, manufacturer of clocks, jewelry, etc., has acquired adjoining property on Sansom Street, and plans a twelve-story reinforced-concrete addition.

The C. H. Wheeler Mfg. Company, Eighteenth Street and Lehigh Avenue, Philadelphia, operating machine repair shops, and a pump and valve manufacturing plant, has awarded a contract for the erection of a boiler and engine house addition to cost about \$2,000.

The Keystone Supply & Mfg. Company, Philadelphia, manufacturer of plumbers' supplies, will build a one-story brick addition to its plant, 40 x 100 ft., at 927 North Ninth Street.

The Ford Motor Company, Detroit, Mich., has acquired a tract of about 20 acres at Cape May, N. J., for \$40,000, and is reported to be planning the erection of a branch plant.

Repair shops will be installed in the electrical bureau and garage now being erected by the City Commission, Trenton, N. J., on West Hanover Street, at a cost of about \$78,000. The shops will be equipped to handle electrical and automobile repair work.

The John Douglas Company, Cincinnati, Ohio, operating the Elite Pottery Company, Trenton, N. J., manufacturing plumbing and sanitary earthenware specialties, has increased its capital from \$100,000 to \$850,000 for plant extensions. The company's potteries at Carthage will be doubled in capacity. John Douglas is president.

The John A. Roebling's Sons Company, Trenton, N. J., manufacturer of wire and wire rope, has filed plans for proposed additions to its plant at Elmer and Canal streets. The structures will be one to three stories, 95 x 594 ft., and 89 x 308 ft., and cost \$135,000 and \$120,000 respectively.

The Westinghouse Lamp Company, 165 Broadway, New York, has broken ground for the erection of the first building of its new plant on Pennington Avenue, Trenton, N. J. The structure will be four stories, of reinforced concrete, estimated to cost \$280,000.

The board of trustees of the School of Industrial Arts, Trenton, N. J., is planning the erection of a new shop school for industrial education, estimated to cost, with equipment, \$40,000. John A. Campbell is president.

The Rivetless Chain & Engineering Company, Avon, Pa., has commenced the building of extensions to its plant to be used for drop hammer work and the installation of new heating furnaces. Jack L. Straub, Lancaster, is president.

The Weimer Chain & Iron Company, Eighth Avenue, Lebanon, Pa., is arranging for the early erection of an addition to its plant on property recently acquired.

The Cashman Tool Company, Waynesboro, Pa., recently organized, has acquired the plant formerly occupied by the Wayne Paint Company, and will equip it with machinery for the manufacture of a patented reamer. C. G. Cashman is president.

The Industrial Foundry & Machine Company, Pottstown, Pa., is being organized to operate a plant for the production of steel, iron and other metal specialties. Elmer C. Peiffer, C. M. Stely and Daniel L. Evans will be the incorporators.

The Penn Art Steel Works, Erie, Pa., has been organized with a capital of \$25,000, to manufacture special art steel products. L. E. Isaacs, Erie, is head of the company.

The Allentown Standard Mfg. Company, Allentown, has been incorporated with a capital stock of \$25,000, to manufacture tin, japanned, lithographed, copper and galvanized sheet metal ware. The incorporators are Harry Berman, Samuel I. Perlman, L. Perlman, and Henry J. Franklin, of Allentown; B. Kaslofsky, Northampton, and William Berman, Philadelphia.

Barrett, Haentjens & Co., Hazleton, Pa., have been incorporated, with a capital stock of \$50,000, to carry on business as engineers, founders and machinists. The incorporators are Edward F. Barrett, Otto Haentjens, Charles Rowland and J. P. Costello.

The Caskey & Keen Company, Philadelphia, has been incorporated, with a capital stock of \$100,000, to carry on a general foundry and machine shop business, including the

manufacture of iron castings, machinery and heating apparatus. The incorporators are William J. Steen, 3330 North Sixteenth Street; Davis L. Moore, Jr., 3818 North Eighteenth Street, and Frank S. Muzzey, 7320 Bryan Street.

The Manwaring & Cummins Company, Philadelphia, has been incorporated, with a capital stock of \$75,000, to engage in general contracting. The incorporators are Roy A. Manwaring, 4918 Pulaski Avenue; John V. Cummins, 904 East Chelton Avenue, and John H. Brown, Jr., 4519 North Eleventh Street.

Baltimore

BALTIMORE, MD., March 5, 1917.

The Newport News Shipbuilding & Dry Dock Company, Newport News, Va., has authorized improvements to its plant approximating in cost \$850,000, covering work on new buildings, alterations to the present plant, purchase of machinery and yard improvements. The new structures will be of brick and steel. Work has already started and is in charge of G. L. Smith, civil engineer. The purchase of machinery and other equipment will be in charge of H. P. Phelps, plant engineer. Homer L. Ferguson is president and general manager.

To deal in machinery, engines, boilers, etc., the R. D. Grier & Sons Company, Salisbury, Md., has been incorporated with \$50,000 capital stock by Robert D., Ralph H. and Alexander T. Grier.

The National Automatic Flying Machine Company of America, Inc., 225-232 Law Building, Baltimore, has been incorporated, with \$300,000 capital stock, by J. Frank Fox, E. A. Fairley and William H. Logue, Jr.

A contract for the construction of a three-story brick plant, 40 x 109 ft., for the International Wood & Paper Products Corporation, 117 Calverton Road, Baltimore, has been awarded to Gladfelter & Chambers, Thirty-sixth Street and Roland Avenue. It will cost about \$27,000.

The Tungsten Products Company, Baltimore and Seventh streets, Highlandtown, Md., has awarded a contract for a one-story addition to its plant.

The Episcopal Home for Homeless Boys, Covington, Va., will erect a power plant to cost about \$25,000.

The Fountain Brush Company, Roanoke, Va., has been incorporated with \$200,000 capital stock. F. M. Spiller is secretary.

Porter & Moore, Norfolk, Va., are seeking prices on small lathes.

The Portsmouth Metal Company, Portsmouth, Va., has been incorporated, with \$50,000 capital stock. A. V. Moore, Norfolk, Va., is president and F. R. Handley, Ocean View, Va., is secretary.

Announcement is made that the Baltimore Gas Appliance & Mfg. Company, Bayard and Hamburg streets, Baltimore, has acquired the General Gas & Appliance Company and the Schmitt Mfg. Company, both of New York City. The companies will be merged and the output of the Baltimore company increased.

Chicago

CHICAGO, ILL., March 5, 1917.

From the standpoint of domestic buyers of machinery who have been chafing under the slow deliveries, the congestion of shipping in the East and the embargo upon shipments from Central Western manufacturers in that direction have been, in such degree as they have affected the situation, advantageous. In numerous instances tools have been made available for delivery in the West which were scheduled for other shipments now impossible. Some of the manufacturers have found occasion for concern in this interference with the natural flow of their orders, but generally speaking the trade has not been greatly disturbed. With one or two exceptions dealers report their foreign inquiry gradually declining, but their local business continuing very attractive.

In this market railroad buying has not been conspicuous, although the Illinois Central will probably buy very shortly a number of tools and the Burlington, having postponed purchase of about two-thirds of its large lists, has closed for the balance. The purchase of foundry equipment continues an important part of the general machinery activity.

Libby, McNeil & Libby, Union Stock Yards, Chicago, through Phillip Larmon, general superintendent, is receiving bids covering a six-story reinforced concrete factory, 80 x 150 ft., to be used for the manufacture of lard pails. The plant is expected to cost \$100,000.

E. H. Vavra & Co., manufacturers of paper boxes, 1002 South Canal Street, Chicago, will build a one-story mill type factory, 125 x 126 ft., to cost \$40,000.

The Squire Dingee Company, Elston Avenue, Chicago, is about to erect a three-story factory, 50 x 110 ft., to cost \$125,000. Brown & Walcott, 19 South LaSalle Street, are the architects.

The Standard Cap & Seal Company, 327 North Fifth Avenue, Chicago, is building a four-story factory, 100 x 150 ft., to cost \$140,000.

The Chicago Metallic Company, 745 E. Thirty-ninth Street, Chicago, is about to erect a two-story factory, 60 x 165 ft., at a cost of \$20,000.

The Illinois Central Railroad Company, Chicago, has not yet completed plans for the construction of a shop and roundhouse at Palestine, Ill. Necessary equipment will be purchased by R. W. Bell, general superintendent of motive power.

The Maytag Company, Newton, Iowa, has decided to delay the building of its foundry indefinitely on account of the high cost of structural materials. F. L. Maytag is president.

Peter Terwilliger, 2912 Carroll Avenue, Chicago, will build a one-story factory, 60 x 145 ft., to cost \$20,000. C. Frank Johnson, 79 East Adams Street, is the architect.

The Omar Machine Company, 1438 Bryan Place, Chicago, has filed notice of a change of name to the Fulton Machine Tool Company and of an increase in its capital stock from \$10,000 to \$25,000.

The Chicago Scrap Iron & Machinery Company has been incorporated with a capital of \$2,500 by Joseph Kamfer, A. E. Denstein and B. Smith.

The Illinois Engineer & Machinery Company, Chicago, organized with a capital of \$5,000, has applied for a charter, the incorporators being John C. Williams, F. A. Thorpe and M. E. Olson.

A. B. Gochenour, president and general manager of the Chicago Insulated Wire & Mfg. Company, Sycamore, Ill., advises that the new construction the company is undertaking will represent an investment of about \$75,000.

The Republic Fence Company, North Chicago, Ill., is planning the erection of a new building to replace one recently destroyed by fire.

The Chicago Recording Scale Company, Waukegan, Ill., has begun excavation work for an addition to its factory.

The Duluth Drop Forge & Harrow Company, Forty-ninth Avenue West and Wadena Street, Duluth, Minn., is about to erect an addition to its factory, estimates for which are being received by Gillison & Caron, architects, of that city.

Milwaukee

MILWAUKEE, WIS., March 5, 1917.

Conditions in the local machine-tool industry are again assuming the feverish aspect which resulted from the overwhelming demand in the early part of 1916. As spring approaches, orders are being placed for standard tools at practically the same rate as a year ago, in spite of increased prices and the difficulty in making deliveries because of the congestion of railroad traffic, which continues without appreciable relief. One of the most favorable factors, however, is the enlarged productive facilities of all Milwaukee tool builders. Since a year ago, every manufacturer in this district has erected plant extensions and it is conservatively estimated that the aggregate production at this time is from 40 to 50 per cent larger than in 1916. Local requirements continue to grow. Existing shops are planning enlargement. Machine shops which need larger facilities, but do not care to undertake heavy investments in new construction, are re-arranging equipment to gain the use of every available foot of floor space. With the demand for tools for replacements, this furnishes a considerable requirement outside of the regular run of orders to be filled. Foundries complain of the shortage of coke, due to the inability of railroads to switch cars without delay even in the heart of this city, because of the congestion in all yards. It has taken as long as two weeks to get a car of coke from its point of origin to a furnace that is only one and a half or two miles away.

The Christensen Engineering Company, 841-847 Thirtieth Street, Milwaukee, has sold its plant and business to a new company, organized with an authorized capital of \$200,000, under the name of Monarch Machine Works. The Christensen Company is a manufacturer of screw machines, gas engines, compressed air devices, etc., and does a jobbing machine-shop business. The Monarch Company is organized by William J. and Philip A. Koehring, chief stockholders of the Koehring Machine Company, Thirty-first Street and Concordia Avenue, Milwaukee, manufacturer of power concrete mixers and contractors' equipment. The Monarch business will be operated as a distinct and separate organization. Full details will be issued later. No announcement is made by the members of the Christensen Company as to their future

plans. Nels A. Christensen is president and general manager, and R. L. Gruber is secretary and treasurer.

The Crown Metal Company, 871-881 Robinson Street, Milwaukee, organized recently, has incorporated its business under the same style. The capital stock is \$30,000 and the incorporators are Walter C. Davis, George S. and Samuel H. Meredith.

O'Leary Brothers, Green Bay, Wis., structural work, boilers, etc., are having plans prepared for a shop to replace that which was destroyed by fire several weeks ago. Work will begin about April 1.

The Northwestern Bridge & Iron Company, 127 South Water Street, Milwaukee, has completed arrangements for the erection and equipment of a new structural fabricating plant, to be located at Twenty-seventh and Hopkins streets, Milwaukee. It will be of steel and brick, 100 x 180 ft., two stories, and will require punches, shears, bending rolls, bulldozers and similar tools, contracts for which will be placed at once. The drive throughout will be by individual electric motors. Albert Pergande is president and general manager, in charge of design and erection.

The Jersild Fire Escape Company, Waupaca, Wis., has started production and is employing between 25 and 30 men.

The Milwaukee Corrugating Company, Milwaukee, is considering tentative plans for a large addition to its main works at Thirty-sixth Avenue and Burnham Street, West Milwaukee. Details are withheld for the present. Louis Kuehn is president and general manager.

Chilton, Wis., is taking bids for the construction of a pumping station, with two pumping units. A. J. Pfeffer is city clerk and Jerry Donohue, Sheboygan, Wis., is consulting engineer.

The Chamber of Commerce, Wausau, Wis., has raised a fund of \$65,000 to provide a plant and equipment for the Lamson Motor Truck & Tractor Company, Chicago, which has agreed to move from Chicago. The chamber is taking bids this week for sites of five acres or more as a location of the new plant. Swarthout & Speer, architects, Spencer Building, Wausau, Wis., will prepare the plans. The main building will be 200 x 300 ft., one story and part basement, with sawtooth roof, of reinforced concrete and brick, and is to be completed June 15. J. N. Manson is chairman of the committee in charge.

B. Schaefer & Sons Company, Schleisingsville, Wis., will build an addition to more than double the capacity of its pipe organ and musical instrument factory.

The Hayward Automobile Company, Hayward, Wis., is installing new machine-shop equipment to meet largely increased demands for automobile and commercial work.

The Globe Shipbuilding Company, Superior, Wis., has been organized by B. C. Cooke, Capt. C. A. Massey and M. L. McMahon, to undertake contracts for one or more steel freighters of 3500 tons register for ocean service. A new shipyard is to be established and will be in charge of James MacKellar, for many years connected with the Superior Shipbuilding Company.

The Janesville Carriage Company, Janesville, Wis., will remodel its works into an automobile body plant, which will specialize in omnibus, hearse and other special closed car work. C. A. Buchholz is general manager.

The water and light commission, Clintonville, Wis., will take bids until 6 p. m., March 19, for furnishing two 250-hp. fire or water-tube boilers of 150-lb. pressure, and one 1000-hp. cast-iron or steel open feed water heater.

The water and light commission, Neillsville, Wis., will take bids soon for furnishing an electric pumping unit of 5500 gal. per min. capacity. Mead & Seastone, Madison, Wis., are the consulting engineers.

The Manufacturers' Foundry Company, Fifteenth and Oklahoma avenues, Milwaukee, has awarded contracts for the erection of a shop addition which will increase its capacity about 50 per cent. The steel work has been let to the Milwaukee Structural Steel Company.

The Oneida Motor Truck Company, Green Bay, Wis., organized recently intends to lease factory and shop quarters for the present and will not erect a plant of its own until the spring of 1918. It will manufacture motor trucks and fire apparatus, purchasing such units as motors, transmissions, frames, axles, etc.

James Binning, county highway commissioner, Oshkosh, Wis., is taking bids for a 22-hp. motor and other equipment for operating a rolling lift bascule bridge.

The Beaver Dam Castings Company, Beaver Dam, Wis., on March 1 started operations in the former plant of the North Side Foundry Company, which was idle for several years. The product will be aluminum, brass and gray-iron castings.

The Merrill Iron Works, Merrill, Wis., has passed into

the exclusive ownership of F. E. Taylor and W. V. Taylor, who purchased the interest of H. B. Richmond, now of Shawano, Wis. George Sweet is retained as general superintendent.

C. H. Swartzlow, Juda, Wis., is preparing to build an oil engine-driven electric light and power plant to cost about \$15,000 complete.

The Prison City Garage Company, Waupun, Wis., has sold its garage to Meiklejohn & Son, who will add a full second story and install new machine-shop equipment.

The Schaefer Mfg. Company, Berlin, Wis., manufacturer of wood-working, quarry and other machinery, is increasing its machine shop capacity 100 per cent and is now buying tools and equipment for it. Frank D. Chapman is president and manager.

The Evinrude Motor Company, 279-283 Walker Street, Milwaukee, will complete plans within ten days or two weeks for a complete new gas and oil engine and motor plant costing \$250,000 on a new site. The company has increased its capital stock from \$350,000 to \$600,000 to finance the construction and to enlarge its business to include a general line of oil engines for farm and general utility purposes in addition to its present line of gasoline rowboat motors. Competitive plans and specifications for the new works are under consideration. The Evinrude Company is in the market for a large list of new tools, machinery and power equipment, details of which will be issued later. Christopher J. Meyer is president and general manager.

The Milwaukee board of school directors will take bids soon for the erection and equipment of a boiler house containing two units for the Mineral Street graded school. Van Ryn & DeGelleke, Milwaukee, are the architects.

The Jaeschke Brothers Foundry Company, 3026 Locust Street, Milwaukee, is taking bids for another foundry addition, designed by Herbst & Hufschmidt, architects. It will cost about \$15,000.

Detroit

DETROIT, MICH., March 5, 1917.

The crisis in the freight congestion and coal scarcity has passed and manufacturers are planning enlargements to take care of increased business. As a result the machine tool market is much stronger. Numerous inquiries were received the past week for standard machines, and although no large orders were closed, several are pending. Deliveries on standard machines still require several months, but dealers state that the situation is gradually improving.

The Detroit Gauge & Metal Stamping Company, Detroit, has been incorporated with a capital stock of \$50,000. It has taken over the business of the Retlaw Mfg. Company, manufacturer of gasoline gages, 812 Woodbridge Street, where additional equipment will be installed and the factory space enlarged. The officers are O. S. Kelly, president; E. C. Lewis, vice-president; Seabourn Livingstone, secretary and treasurer.

The Petoskey Paper Mill, Petoskey, Mich., will install additional equipment to increase the capacity of the plant, which is running three shifts per day.

The Manistee Leather Company, Manistee, Mich., has been organized with a capital of \$30,000 to manufacture hide and leather products. It will erect a factory and begin operation within 90 days. Philip P. Schnorbach is president.

In conjunction with Thomas W. Benoist, of the Benoist Aeroplane Company, Sandusky, Ohio, a group of Detroit business men are planning a company to manufacture aeroplanes. Local men interested are P. W. Murphy, Steven Smith and Steven Peplenski.

The Battle Creek Bread Wrapping Machine Company, Battle Creek, Mich., has increased its capital stock from \$100,000 to \$150,000.

The General Engineering Company, Detroit, manufacturer of the Doble steam car, has moved its offices from 128th Street to larger quarters on the eighth floor of the Marquette Building.

The Commonwealth Power Railway & Light Company, with offices at 14 Wall Street, New York, the holding company of many lighting, traction and power facilities of lower Michigan, will start work early in the spring on its fifth hydroelectric development plant on the Au Sable River.

The General Machine & Tool Company, Jackson, Mich., will build an addition 75 x 90 ft.

The Manistee Art Furniture Company, Manistee, Mich., which removed from Muskegon, Mich., last June, has taken possession of the former Manistee Watch Company's plant, having about 70,000 sq. ft. of floor space. It recently increased its capital stock from \$25,000 to \$50,000. H. H. Stever is president. The company is in the market for elevators and dry kilns.

Cleveland

CLEVELAND, OHIO, March 5, 1917.

New inquiry is plentiful, but orders are not as numerous as a few weeks ago. The volume of business, however, is very satisfactory and a great deal in good live prospects is pending. Among new inquiries is one from a new local company which will require a large amount of equipment for its new factory. Railroad embargoes are seriously interfering with machine-tool shipments and dealers are not getting deliveries on stock orders. Railroad buying is light, but some business was closed the past week by the Lima Locomotive Corporation. The demand for punching and shearing machinery is large, coming from shipbuilding companies in the East and on the Pacific coast. The call for cranes, locomotive cranes, hoists and trolleys is very active.

The Firestone Tire & Rubber Company, Akron, Ohio, has sent out the following list of requirements for its new machine shop:

- Two 16-in. lathes.
- One 36-in. lathe.
- Two 4-ft. radial drilling machines.
- Two 20-in. drilling machines.
- Two sensitive drilling machines.
- One turret lathe.
- One 6-ft. x 6-ft. x 20-ft. planing machine.
- One keyway cutter and slotter.
- One 18-in. shaping machine.
- One 11-in. speed lathe.
- One shaft-centering machine.
- One universal cutter grinding machine.
- One vertical milling machine.
- One routing machine.
- Four 52-in. boring mills.
- Four 62-in. boring mills.
- One 32-ft. 400-ton forcing press.
- One combination punching and shearing machine for 3-in. round stock.
- One 1500-lb. hammer.
- One 14-in. toolroom lathe.
- One 24-in. x 24-in. x 6-ft. planing machine.
- One post drilling machine.
- One horizontal boring mill.
- One multiple spindle drilling machine.

The Stahl Gear & Machine Company, Cleveland, has been incorporated with a capital stock of \$50,000 by George F. and Walter S. Stahl, Phillip E. Gross and others. It will erect a factory at 1390 East Fortieth Street to manufacture rawhide and metal gears. Orders for equipment have been placed and it is expected that operations will begin in about 30 days. George F. Stahl, formerly secretary and treasurer of the Horsburgh & Scott Company, Cleveland, will be president and manager.

The Reynolds Machine Mfg. Company, Massillon, Ohio, has been organized with a capital stock of \$200,000 to take over the Reynolds Pattern & Machine Company, Moline, Ill., which will be moved to Massillon. It will manufacture automatic screw-driving and other special machines. F. C. Snyder is president; E. H. Birney, vice-president; O. F. Binford, secretary and treasurer, and G. D. Reynolds, formerly manager of the Moline plant, is general manager. It is the intention to build a factory as soon as a site is selected.

The Linograph Company, Davenport, Iowa, will move to Massillon, where it will build a factory to manufacture type-casting machines. It is stated that the first of four units, a five-story brick building, 80 x 160 ft., will be started shortly.

The Canton Drop Forging & Mfg. Company, Canton, Ohio, is contemplating an addition to its factory.

The Bock Bearing Company, Toledo, Ohio, has completed a new four-story building, in which machinery is now being installed, and which gives it four times the former floor space.

The Elkirk Machine Company, Toledo, has been incorporated with a capital stock of \$20,000 by Robert L. and Robert M. Ellery of the Toledo Drill & Tool Company and others, and will erect a building on Pinewood Avenue for the manufacture of special machinery.

The National Lamp Works of the General Electric Company will erect a three-story building, 168 x 200 ft., near its present works in Warren, Ohio.

The Ohio Steel Foundry Company, Lima, Ohio, has increased its capital stock from \$800,000 to \$1,300,000.

The Lincoln Stove Company, Fremont, Ohio, is contemplating the erection of an addition.

The Allen Motor Company, Fostoria, Ohio, is preparing plans for its new plant, which will include a main building, one story, of brick, concrete and steel, 100 x 1000 ft., and a wing 54 x 175 ft.

The Klein Iron Works Company, Bellevue, Ohio, will increase its capital stock from \$15,000 to \$50,000, necessitated by the increase in its business. It is stated that additional equipment will be added.

Indianapolis

INDIANAPOLIS, IND., March 5, 1917.

The Lyons Atlas Company, Indianapolis, has purchased the plant of the Hume Mfg. Company, Hume, Ill., which it will merge with its Indianapolis plant, and thus will add to its lines the manufacture of tractors. The company will continue the making of internal combustion engines and Diesel and gasoline engines for marine and stationary service. The company proposes to put on the market 5000 tractors this year. The addition to its lines will increase the working force from 1200 to 1600 men. The tractor will be of universal design. It operates its own foundries, machine shops and chemical and physical laboratories. The company has inquiries for tractors from India, Russia, Brazil, Switzerland, Cuba, England, Norway, Scotland and Canada. The tractor will be built in two sizes, to operate three and six plows, and will weigh 4300 to 7100 lbs.

The Universal Motor Truck Company, Indianapolis, has been incorporated with \$30,000 capital stock to manufacture motor vehicles. The directors are F. C. Duncan, E. Dawson and Z. E. Keller.

The Automatic Farm Implement Company, Elkhart, Ind., has been organized with a capital of \$50,000 to manufacture farm machinery. The incorporators are John G. Schacht, Claude E. Jackson, Ernest A. Skinner and Earl Belden.

The Brazil Motors Company, Brazil, Ind., recently organized, has purchased the factory of the Brazil Fence Company, where it will manufacture a front gear-driven truck.

The Lavelle Foundry Company, Anderson, Ind., has purchased the property of the Crystal Ice Company, adjoining its foundry. The additional buildings will be used for storage purposes at present, but will be later employed for the expansion of the foundry.

The Studebaker Corporation, South Bend, Ind., which was stated a week ago as intending to erect a continuous gray-iron foundry, will also build a machine shop, 200 x 700 ft. Its forge shop is to be 160 x 400 ft.

The Hoover Mfg. Company, Anderson, Ind., Edward Hoover, manager, will manufacture a revolving tail point for engine lathes and expects to be in the market in the near future for equipment.

Hubbard & Co., Pittsburgh, Pa., have purchased the Jackson shovel and tool plant at Hartford City, Ind., and will double the capacity.

The Allison Experimental Company, Indianapolis, Ind., has been organized by Quincy A. Myers, Edward E. Gates and Everett F. McCoy. The company has a capital of \$10,000 and will deal in machinery.

The Fort Wayne Rolling Mill Company, Fort Wayne, Ind., has increased its capital stock from \$100,000 to \$300,000.

The Vance Safety Lock Company, Decatur, Ind., has been incorporated with \$10,000 capital stock to manufacture automatic safety locks. The directors are Oscar L. Vance, August H. Sellemeyer and Fred Heuer.

The Faultless Caster Company, Evansville, Ind., is reported to have received the contract to supply casters for all Edison phonographs.

The Gary Screw & Bolt Company, Gary, Ind., has increased its capital stock from \$400,000 to \$1,000,000.

The Columbia Rubber Company, having obtained a bonus of \$50,000, will erect a plant at Vincennes, Ind., to manufacture auto tires and tubes. It will have \$1,000,000 capital stock. The Chamber of Commerce has raised the money by the sale of stock.

The Connersville Blower Company, Connersville, Ind., has increased its capital stock from \$400,000 to \$750,000.

The Jasper Novelty Works, Jasper, Ind., will erect a three-story brick addition to its plant, 40 x 150 ft.

The Noble Motor Truck Company, Kendallville, Ind., has been incorporated with \$30,000 capital stock to manufacture motor vehicles. The directors are H. L. Postal, Columbus, G. M. Paterson and C. J. Munton, general manager of the Fort Wayne & Northern Indiana Railway Company, who is president.

The Southern Equipment & Supply Company, Bedford, Ind., has filed preliminary articles of dissolution.

The Southern Stove Works and the Evansville Stove Works, Evansville, Ind., have been consolidated.

The Superb Mfg. Company, Remington, Ind., manufacturer of automobile shock absorbers, will build a factory at Monticello and move its plant there.

The Lawrence Mfg. Company, Indianapolis, has been incorporated with \$50,000 capital stock to manufacture cookers and steamers. The directors are Philip M. Lawrence, Clarkson, Neb., Frank Lawrence, Loma, Neb., and A. J. Sorenson, Decorah, Iowa.

The Sanitary Detachable Mop Company, Indianapolis, has been incorporated, with \$50,000 capital stock, to manufacture novelties. Thomas Zinkan, Lewis A. McKay and Albert M. Bristor are the directors.

The Warriner Mfg. Company, Terre Haute, Ind., has been incorporated, with \$10,000 capital stock, to manufacture apparatus for softening water. The directors are Walter Warriner, Herbert W. Bond and John K. Kuhns.

The Terre Haute Mop Company, Terre Haute, Ind., has been incorporated, with \$50,000 capital stock, to manufacture patented novelties. The directors are Nathan M. Ely, R. O. Ely and C. J. Rogers.

The Land-Dilks Company, Richmond, Ind., has been incorporated, with \$25,000 capital stock, to manufacture wood products. Walter E. Land, George H. Dilks and Wilfred Jessup are the directors.

Cincinnati

CINCINNATI, OHIO, March 5, 1917.

It is generally known that the United States Government has been a heavy buyer of machine tools lately, many of which orders have been placed indirectly. Railroad buying has also been heavier than is generally supposed, and the railroads now do not seem to be inclined to quibble over present costs as formerly. It is predicted that prices on all kinds of machinery will have to be advanced soon in order to keep up with increasing manufacturing costs. Castings are advancing steadily and high-speed steel drills have been marked up within the past week. Labor is also commanding a higher rate than at any previous time, when the different bonus systems are considered.

The inability of the sawmills in the South to make shipments North and West has adversely affected the demand for sawmill machinery and supplies. The demand for portable electric tools was never better, although the export business is practically cut off. The jobbing foundries are working on full time and so far have not been compelled to shut down on account of a coke shortage.

The Cincinnati Grinder Company, Cincinnati, Ohio, A. C. Hoefflinghoff, president, will require the following additional machine tools for installation in its new factory now under construction.

One 36-in. x 36-in. 14-ft. planing machine with two heads on cross rail.

One 20-in. x 8-ft. single back-gear lathe with loose chain of gears.

One 16-in. x 8-ft. back-gear lathe with three step cones.

One 16-in. x 8-ft. three-step cone, double-backed geared lathe, with taper attachment.

One horizontal boring mill.

One 36-in. vertical boring mill.

One 1½-in. x 9-ft. screw machine.

One No. 3 horizontal heavy-duty milling machine.

One double-end floor grinder.

One saw table.

The Dayton Adding Machine & Time Lock Company, Dayton, Ohio, is the name of a new company created through the consolidation of the Dayton Time Lock Company, Dayton, and the Harrison Balancing Machine Company, Columbus, Ohio. A large factory will be constructed at Dayton.

The Ohio State Stove Company, Columbus, Ohio, has had plans prepared for an addition to its plant that will increase its capacity over 25 per cent.

The C. A. S. Products Company, Columbus, Ohio, maker of automobile gears, contemplates making an extensive addition to its plant. Machinery requirements are not yet known.

Budd & Ranney, Columbus, Ohio, general machinists, whose plant was recently destroyed by fire, are fitting up a shop at 236 North Water Street.

The Commercial Car Unit Company, Philadelphia, Pa., will establish an assembling plant at Columbus, Ohio.

The Laboratory Supply Company, Columbus, Ohio, has increased its capital stock from \$50,000 to \$100,000.

The Wadsworth Foundry Company, Wadsworth, Ohio, has been incorporated with \$15,000 capital stock by William F. Hess and others.

The Reliable Lumber & Coal Company, Crittenden, Ky., will establish a wood-working plant in Linwood, a Cincinnati suburb.

The Globe Folding Box Company, Cincinnati, has let contract to Fisher & De Vore for a new plant to be erected at Winton Place.

The Robertson Motor Truck Company, Cincinnati, is having plans prepared for the construction of a garage on East Second Street. A small repair shop will be operated in connection with it.

The Columbia Machine Tool Company, Hamilton, Ohio, recently organized, has let contract for the construction of a machine shop in a Hamilton suburb. The new company will fit up its shop for doing a general machine jobbing business.

The Dickerson Company, Dayton, Ohio, A. V. Dickerson, president, has been incorporated with \$10,000 capital stock. The company operates a general machine shop and will make some additions to its plant at an early date.

The Crown Hardware Company, Dayton, Ohio, manufacturer of hardware specialties, has let contract for an addition to its plant estimated to cost \$24,000.

The C. L. Craig Mfg. Company, Washington Courthouse, Ohio, has been incorporated with \$10,000 capital stock to manufacture plumbing and hardware specialties. J. E. McLean is president.

The Central South

LOUISVILLE, Ky., March 5, 1917.

"Booked far ahead on business" is an almost uniform response from officials of local machinery and steel-working companies when asked how business is. The possibilities in the foreign relations situation have made no appreciable difference. Leading members of trades believe that a declaration of war would stimulate their businesses. Slow deliveries are generally the rule and the transportation difficulties have tended to delay deliveries of material. Boiler business has never been as heavy as at present.

The Lucey Mfg. Corporation of Tennessee, Chattanooga, Tenn., F. E. Workman, general manager, manufacturer of oil-well equipment, is making extensive additions to its plant that will nearly double its present output. Three large steam hammers will be purchased as well as a miscellaneous lot of machine tools. The corporation's purchasing office is in the Woolworth Building, New York.

The Studebaker Corporation has taken options on five plots of ground through the Louisville Industrial Foundation and will establish a factory branch immediately in Louisville. Wilson M. Taylor will be branch manager.

The Nelson Motor Car Company, Ashland, Ky., has been incorporated with capital stock of \$10,000, by J. H. McCleart Hays Nelson and E. L. Helfrich.

The Mid-Continent Oil Company, Irvine, Ky., will erect tankage at Irvine, Ky., with capacity of 1,500,000 bbl. of petroleum, in connection with a refinery which it is proposed to erect in Louisville or Cincinnati. It is estimated that cost of equipping the tankage plant will run to \$2,500,000. Harry Sinclair is president.

Prices on a water turbine for 50-ft. head, to develop 150 hp., direct connected to a 6600-volt generator of 100 kw., etc., are asked for by the Monticello Electric Light & Power Company, Monticello, Ky.

Robert Hurst, Pekin, Ind., has purchased a 25-year franchise for operating an electric light and power plant in Georgetown, Ind., and will establish an oil engine-driven plant.

The S. J. Gardner Foundry & Machine Company, New Albany, Ind., has purchased the plant of the Shrader furniture factory adjoining its property for \$5,300. The extension of the plant of the purchasing company will be undertaken later on.

The Ross-Meehan Foundry Company, Chattanooga, Tenn., has approved plans for erection of an annealing-room addition, 140 x 200 ft., of brick and steel.

The Hardwick Stove Company, Chattanooga, Tenn., has purchased the buildings and site of the Bradley Packing & Cold Storage Company, adjoining its plant, for \$7,500, and will add them to its factory.

The John G. Duncan Company, Knoxville, Tenn., is in the market for a second-hand air compressor, single or two stage, with 600 to 750 cu. ft. capacity, and is asking for dealers' prices on a 150 to 200-hp. return-tubular boiler or water-tube boiler for 175 lb. working pressure.

The University of West Tennessee, Memphis, Tenn., is making plans for the re-equipment of its machine shop, destroyed some time ago by fire. Dr. M. V. Lynk is president.

The Manchester Electric Light & Power Company, Manchester, Tenn., has been incorporated with capital stock of \$5,000 by T. H. Webb, J. B. Wall and others.

The Electric Equipment Company, Nashville, Tenn., has been incorporated with capital of \$10,000, by J. T. Shannon, J. H. Conn and others.

St. Louis

ST. LOUIS, Mo., March 5, 1917.

The machine-tool business has been showing steady improvement the past week. Dealers report the aggregate of business quite satisfactory and well up with the total maintained before the period of hesitancy in the latter part of January. Purchases continue along negotiatory lines rather than by the issue of lists.

The Walsh Tie & Lumber Company, St. Louis, has increased its capital from \$50,000 to \$100,000 to enlarge its capacity.

The Cash Register Sales Company, St. Louis, has been incorporated with a capital stock of \$15,000 by J. H. Stacy and E. L. Tator and will establish a factory for rebuilding and repairing registers, etc.

The Provident Chemical Company, St. Louis, Mo., will erect two buildings, in addition to its present plant, which will be equipped at a cost in excess of \$50,000.

The Missouri-Arkansas Oxygen Company, St. Louis, Mo., has been incorporated, with a capital stock of \$25,000, by Louis Rosen, Oscar G. Reichardt, Milton G. Clymer, Barton T. Clifford and others to manufacture oxygen, hydrogen, etc., and is in the market for equipment.

The Verdiphone Record Company, St. Louis, has been incorporated with a capital stock of \$500,000 by Paul Dillon, Herman Gross, Martin Rubenstein and others to manufacture talking machine records.

The Automatic Insulation Company, Cameron, Mo., has been incorporated with a capital stock of \$50,000 by C. H. Risley, E. L. Clark and C. R. Megee to manufacture high and low tension electric insulators.

The St. Joseph Structural Steel Company, St. Joseph, Mo., has been incorporated, with a capital stock of \$50,000, by T. W. Dood, R. E. Riddle and C. R. Megee.

Joplin, Mo., will expend about \$200,000 in enlarging its electric light and power plant. The mayor is in charge.

Marshall, Mo., will install an electric light plant at a cost of about \$75,000. Henrici-Kent & Lowry, Kansas City, Mo., are engineers in charge.

Poplar Bluff, Mo., is equipping an electric light and power plant to cost about \$75,000, under the direction of the Fuller-Coult Company, engineer, St. Louis.

The Miller-Cooper Ink Company, John M. Miller, president, Third and Wyandotte Streets, Kansas City, Mo., will equip a plant with machinery costing about \$50,000 for the manufacture of printing inks.

The Coaster Mfg. Company, Kansas City, Mo., has been incorporated with a capital stock of \$12,000, by Reed Byers, John Seaton and Arthur C. Brown, to manufacture metal wagons.

The Burke Brick & Tile Company, Fort Smith, Ark., has been incorporated, with a capital stock of \$75,000, by H. C. McKinney, H. W. Hardy and George S. Miles and will equip a clay-working plant.

The Lignite Products Company, Lester, Ark., J. R. Robinson, general manager, is in the market for equipment for the manufacture of by-products from lignite and will later develop lignite properties for fuel purposes.

The County Court, Helena, Ark., under plans prepared by Walter E. Winn, engineer, is preparing for extensive drainage work which will include a pumping station to cost \$913,500.

The DeWitt Mfg. Company, Russellville, Ark., D. M. DeWitt, president and manager, will install lathes, milling machines, drill presses, grinding machines, brass foundry equipment, electric motors, etc., for the manufacture of carburetors. About \$25,000 worth of machinery will be bought.

The water and sewer commissioners, Eudora, Ark., S. W. Douglas, secretary, are receiving bids for waterworks and sewer system equipment including oil engines, pumps, etc. Xavier A. Kramer, Magnolia, Miss., is the engineer.

The Board of Trustees, Kaw City, Okla., is receiving bids on equipment for a waterworks plant and electric light and power plant equipment, including an oil engine, a centrifugal pump, generators, etc.

The Mississippi Centennial Exposition Company, Gulfport, Miss., will receive bids until March 27 for an electric light and power plant. John T. Connell is director of works.

The Dixie Cooperaage Company, Vicksburg, Miss., will equip a mill at a cost of about \$40,000. O. H. Trook, Indianapolis, Ind.; John E. Osborn, E. E. Meek and Dale Welsh, Greensburg, Ind., are interested.

DeRidder, La., C. C. Davis, mayor, is receiving bids for waterworks equipment and accessories, including pumping station, etc. Xavier A. Kramer, Magnolia, Miss., is engineer in charge. Oil engines, pumps, etc., of 1,000,000 gal per day capacity are required.

The Yazoo & Mississippi Valley Railroad will equip a mechanically operated coaling station at Baton Rouge, La., to cost about \$20,000.

R. W. Henderson, Talladega, Ala., and associates, will equip a cottonseed oil mill at Shreveport, La., to cost \$500,000.

Birmingham

BIRMINGHAM, ALA., March 5, 1917.

Coal mines and coking plants, as well as other operations connected with mining, are calling for engines, boilers and pumps in a large volume continuously in spite of the high prices, which are in instances as much as 100 per cent over those of last year. The wholesale machinery trade is vigorous in every respect.

The National Pipe & Foundry Company, Attalla, Ala., will build an addition for the manufacture of steam fittings, with a daily capacity of 20 tons.

F. M. Perry & Sons, Montgomery, contemplate building an ice factory to cost \$50,000.

The Georgia Railway, Light & Power Company, Cartersville, Ga., will increase its output of electric current. The construction of a power dam on the Etowah River is reported contemplated.

The Fitzgerald Iron Works, Fitzgerald, Ga., will rebuild its burnt-machine shop. E. N. Davis is president.

The Charlotte Machine Company, successor to the T. J. Dellinger Machine Company, machinery repairer, Charlotte, N. C., has been incorporated with a capital stock of \$25,000. E. Gribble is president and treasurer; C. B. Suttle is vice-president and L. H. Painter is secretary. The company operates a plant at 2000 South Boulevard, Charlotte, for the manufacture of textile machinery repair parts.

Texas

AUSTIN, TEX., March 3, 1917.

Plans are on foot for the construction of an unusually large number of industrial plants in various parts of the State and consequently the demand for machinery of this character is very good.

The Consumers Ice & Coal Company, Port Arthur, will build an ice factory to cost about \$30,000. J. F. Jakowicz is active in the enterprise.

The City Commission, Dallas, will call for bids for the construction of a sewage pumping station to cost about \$30,000. Hal Moseley is the city engineer.

The San Antonio & Aransas Pass Railroad has purchased a tract of land adjacent to San Antonio on which it will build new terminals, including shops and roundhouses. The improvements will cost about \$1,000,000.

It is announced that as soon as the United States Bureau of Indian Affairs approves the proposal of the Texas Power & Light Company and the Texas Electric Railway Company to build an electric power plant on the north bank of the Red River in Oklahoma, five miles north of Denison, the work of construction will be started. The proposed plant will cost about \$750,000. The Legislature of Oklahoma has already given authority on the part of the State for the building of the plant.

The Medina Fuller's Earth Company, San Antonio, has been organized, with a capital stock of \$100,000, and will install machinery and equipment to cost \$150,000 for the purpose of mining a deposit of Fuller's earth. L. R. Parker, Aurora, Ill., is active in the promotion.

It is announced by H. Clay Pierce, president of the Pierce Fordyce Oil Association, that it will erect an addition to its oil refinery at Fort Worth to cost \$500,000.

The Lockhart Compress Company, Lockhart, which recently passed into new hands, will install high density cotton compresses.

San Francisco

SAN FRANCISCO, CAL., Feb. 27, 1917.

Heavy rains throughout California have brought confirmations for a lot of business which had been held up owing to the dry weather. There has been a marked improvement in the demand from automobile repair shops from the Sacramento and San Joaquin valleys. The storm has, however, had a bad effect in mining development and the call from the mining sections is very slow. The shipyards are still in the market for small additions, and some complete installations of large capacity are talked of, though definite plans are lacking. Advances in prices have been made, but these have been received as a matter of course, and are not thought to have had much effect on the demand.

The Richmond Pressed Brick Company, Richmond, Cal., is preparing to spend \$150,000 in additions and new machinery.

The San Francisco branch of the Columbia Steel Company will add a five-ton open-hearth acid furnace. Two new compressors and a new powerhouse have just been completed at a cost of \$25,000.

R. T. Stone and other, operating under the name of the Terminal Co-operative Shipbuilding & Dry Dock Company, have asked for a 25-year lease from the city of Oakland on 2000 ft. of San Francisco Bay frontage. Plans are announced for a shipyard, including a floating dry dock of 12,000 tons lifting capacity, three sets of ways, and a machine shop and foundry equipped to build Diesel engines.

The Fiber & Products Company, Ltd., Honolulu, T. H., has been incorporated with a capital stock of \$75,000 by A. J. Formilyant, A. W. VanValkenburg, A. Z. Rothschild, H. G. Dillingham, C. B. Cooper, R. W. Atkinson and W. F. Dillingham to put in a plant for the manufacture of articles from coconut fiber.

The Spanish-American Industrial School at Gardena, Cal., intends to erect and furnish a machine shop on its grounds.

The Hercules Powder Company, Wilmington, Del., plans a large amount of new equipment for its kelp-harvesting plant at Chula Vista, San Diego, Cal., including a complete floating machine shop for repairing kelp harvesters.

The Valveless Rotary Pump Company, San Francisco, Cal., has bought a site in Oakland on the east side of San Francisco Bay, and announces plans for the erection of a factory to cost approximately \$150,000.

The Atlas-Imperial Gas Engine Company, Oakland, Cal., is putting in an addition to its erecting and testing shop. A 40-ton and a 5-ton electric crane and a 20-ton Howe scales are to be put in. A new industrial railroad is to be put in across the yards.

The Standard Gas Engine Company, Oakland, Cal., is erecting a story and one-half building, 55 x 85 ft., to be used as a brass foundry. Complete brass foundry equipment will be put in.

The Columbus Electric & Power Company, Columbus, N. M., has been incorporated with a capital stock of \$200,000 by J. L. Greenwood, C. M. Greenwood and B. N. Reed. It will take over a plant and install new equipment.

The Los Angeles Can Company, 305 North Avenue Twenty, Los Angeles, will build a one-story machine shop and garage, 80 x 80 ft.

The plant of the Langton Door & Sash Company, 1627 South Alameda Street, Los Angeles, was partly destroyed by fire recently with a loss estimated at \$12,000.

The American System of Reinforcing of California, Inc., 1116 Washington Building, Los Angeles, recently incorporated with a capital of \$50,000, is having plans prepared for a plant at Torrance for the fabricating of metal spiral column reinforcing. Two structures will be built, 50 x 150 ft., and 50 x 56 ft. N. E. Dawson and N. W. Howard are heads of the company.

The Acme Brass Foundry Company, 860 North Main Street, Los Angeles, has secured an order for brass castings and fittings from the Salt Lake Railroad, totaling about \$100,000.

Marcus Pluth, 111 West Nineteenth Street, Los Angeles, is planning the erection of four hydroelectric power plants on Whitewater River and Snow Creek.

The Moreland Motor Truck Company, 1701 North Main Street, Los Angeles, manufacturer of automobile trucks, is planning the erection of a new plant at Alhambra to cost about \$200,000.

The Pacific Northwest

SEATTLE, WASH., Feb. 27, 1917.

The shipbuilding industry continues extremely active, and machinery houses throughout the Northwest are doing a large business in tools and repair work.

The Great Northern Casket Company, Salem, Ore., has plans under way for the establishment of a factory in Portland, Ore., to cost \$20,000. The company is owned by Merwin Brothers.

Frank Warren, mayor, Warrenton, Ore., is at the head of a project to raise \$10,000 to be used in the establishment of a shipbuilding plant in that city. More than half of the amount has been raised.

The Sloan Shipbuilding Company, Olympia, Wash., has purchased the plant of the Capital City Iron Works and will make it a part of its shipyard plant. Philip D. Sloan is president.

The A & F Structural Company, Eugene, Ore., has purchased the Cottage Grove Planing Mill & Mfg. Company, which will be enlarged and new machinery installed.

The Valveless Engine Corporation, Spokane, Wash., plans the construction of a factory costing \$15,000 to manufacture a new type of engine. F. W. Topken is chief engineer.

The Atlas Foundry & Machine Works, South Thirteenth

Street and Wilkeson Avenue, Tacoma, Wash., will build a new pattern shop and foundry, 40 x 225 ft.

The Ames Shipbuilding & Dry Dock Company, Seattle, Wash., has let the contract for erection of a machine shop, 120 x 420 ft., estimated to cost \$35,000.

The Albina Engine & Machine Works, Portland, Ore., will construct three shipways on property leased from the Montgomery Estate, not vice versa, as has been stated elsewhere. An electric crane is included in the equipment of its new machine shop, which is estimated to cost \$20,000.

The Valentine Mfg. Company, Portland, Ore., has been incorporated for \$30,000, and will erect a building to manufacture toys. L. W. Cronan and J. J. Valentine are the incorporators.

The Peninsula Shipbuilding Company, Portland, Ore., contemplates immediately doubling the capacity of its plant at a cost of \$250,000. It now has four ways.

The American Shipbuilding Corporation, Spokane, Wash., has contracts for eight ships costing \$2,400,000. Each vessel will have a capacity of 2,500,000 ft. of lumber and will be 300 ft. long, equipped with two 380 hp. Diesel engines.

The Pacific Blowpipe Company, Portland, Ore., plans the construction of a factory on a site recently acquired.

Canada

TORONTO, ONT., March 5, 1917.

Russia has established a purchasing commissioner at Ottawa, in the person of Col. Kovaleff, who will make purchases of war supplies for that country. Hitherto Russia has made her large purchases through the Russian supply committee with headquarters in New York. Russia has obtained a considerable amount of goods, munitions and freight cars required for military operations. The Canadian Government has made representations to the Russian Government as to the opportunities for supplying its requirements to a greater extent by purchases in Canada and the advantage of trade between the Allies. Its efforts have been rewarded by the appointment of Col. Kovaleff, which is an event of importance to Canadian producers.

The demand for machinery continues to hold firm in the Canadian market. The greatest call is for power and mining machinery, and in British Columbia lumber-mill equipment is in fair demand. Mining conditions throughout Ontario are better at present than they have ever been before, and many mining companies are greatly extending their plants. The steel industry is showing great activity, the larger firms being filled up with orders to the end of the present year at high prices. In some cases business for 1918 has been offered, but as even better prices are looked for then these manufacturers are awaiting developments before closing on this business. The shortage of coal and the scarcity of skilled labor have been a great drawback to industries for the past six weeks, especially in Ontario. In a number of cases plants were forced to close down for short periods on this account.

The foundry and machine shop at St. Thomas, Ont., owned by the C. Norsworthy Company was damaged by fire Feb. 23 with a loss to the main building and machinery amounting to \$20,000. The plant will be rebuilt and new machinery will be required.

The Western Shell & Box Company, Ltd., Edmonton, Alberta, is in the market for an 18-in. engine lathe, about 4-in. belt, for heavy duty; also a universal milling machine and dividing head.

Bothwell, Ont., will build a waterworks plant to cost \$5,000; a brick pumping station to cost \$1,000, and will be in the market for a Diesel oil engine and motor-driven pump. W. H. Bradley is clerk.

John McDonald, Box 191, Creemore, Ont., will build a machine shop and is asking for prices on equipment.

Charles Smith of the Quebec Harbor Commissioners, Quebec, will receive bids until March 12 for a grain exchange building to have a capacity of 1,000,000 bu.

La Fonderie d'Acier, des Trois Rivières, Ltd., Trois Rivières, Que., has awarded a contract for the erection of an addition to its foundry to cost \$100,000. William Schand is the architect and engineer.

Penman's, Ltd., Coaticook, Que., will build a power house, and will install a 180-hp. turbine to be connected with a generator. T. Pringle & Son, Ltd., Coristine Building, Coaticook, are the engineers.

Chipman & Power, 204 Mail Building, Toronto, are preparing plans for the installation of booster pumps for the Terrace Hill district, Brantford, Ont. F. H. Leonard is district clerk.

The Cataract Electric Company's plant at Orangeville, Ont., was put out of commission by a short circuit. At the generating plant the equipment was burned to scrap. J. M. Deagle is president.

C. H. Rooke, Ltd., Toronto, has been incorporated with a capital stock of \$50,000 by Francis P. Dawson, John E. Corcoran, 687 Dupont Street, William B. Horkins and others to manufacture gasoline engines.

The Great Dominion Filter Company, Ltd., Toronto, has been incorporated with a capital stock of \$100,000 by George W. Davey, George E. Newman, 18 Toronto Street; Murray Ross and others to manufacture water filters.

The Canadian Aeroplanes, Ltd., has been awarded a permit for the erection of a fuselage factory in connection with its plant to be erected on Dufferin Street, Toronto. The fuselage plant will cost \$25,000.

Alterations will be made to the factory of the Dominion Radiator Company, Dufferin Street, Toronto, at a cost of \$2,000.

The George B. Meadows Company, 479 Wellington Street West, Toronto, is in the market for shears for 16-gauge steel, 6 or 8 ft. wide.

Swift Current, Sask., will call for tenders for a 615-hp. oil engine. J. N. Calder is the electrical engineer.

Yorkton, Sask., is receiving tenders for one 357-hp. oil engine, one 280-kw. generator, etc. F. J. Pilkington is town clerk.

The plant owned by W. J. Trick & Co., Oshawa, Ont., manufacturer of interior fittings, was destroyed by fire March 1, with a loss estimated at \$30,000.

The Regal Phonograph Company, Ltd., Toronto, has been incorporated with a capital stock of \$40,000 by Thomas J. W. O'Connor, 26 Queen Street East; Elmer E. Wallace, Donald B. Menzies and others to manufacture phonographs, etc.

The Metal Specialties, Ltd., Toronto, has been incorporated with a capital stock of \$40,000 by Edwin G. Long, Bay and Melinda streets; H. S. Sprague, Joseph E. Belfry and others.

The Quinte Steamships, Ltd., Trenton, Ont., has been incorporated with a capital stock of \$40,000 by Harry Dempsey, Ameliasburgh, Ont.; Harry R. Cory, John C. Young and others of Trenton to build ships.

The McCallum-MacLaren, Ltd., Toronto, has been incorporated with a capital stock of \$40,000 by Benjamin G. McCallum, 82 Hallam Avenue; Charles D. MacLaren, William J. McCallum and others to manufacture hardware, toys, etc.

The Electro Foundries, Ltd., Orillia, Ont., has been incorporated with a capital stock of \$200,000 by Melville B. Tudhope, Joseph R. Russell, Garnet P. Grant and others.

It is reported that the Church-Ross Company, Montreal, has taken over the contract of the Gaylord Engineering & Construction Company at Trenton, Ont., and work on the new arsenal being erected there is nearing completion.

Government Purchases

WASHINGTON, D. C., March 5, 1917.

Sealed proposals will be received until 2 p. m., March 23, at the office of the Board of Awards, Department of Agriculture, Washington, for furnishing shop equipment.

Bids were received by the Bureau of Supplies and Accounts, Navy Department, Washington, Feb. 27, for supplies for the naval surface as follows:

Schedule 592, Ordnance.

Class 1, f. o. b. works—72 torpedo air compressors—Bid 100, \$506,188.92; 156, \$707,520; 161, \$475,080; 189, \$253,920, items 3 and 4 only.

Schedule 689, Steam Engineering.

Class 151, Boston—One vertical turret lathe—Bid 172, \$5,050; 187, informal.

Schedule 690, Steam Engineering.

Class 152, Brooklyn—One engine lathe—Bid 110, \$1,327; 129, \$2,035, \$2,016, and \$2,032; 154, \$2,000; 202, \$2,420.

Class 153, Brooklyn—One motor-driven column shaping machine—Bid 126, \$1,268, \$1,248, and \$1,278; 154, \$1,420; 155, \$954, \$960, and \$1,168.

Schedule 700, Steam Engineering.

Class 241, Philadelphia—Main air pumps and accessories—Bid 55, \$5,812; 60, \$5,495; 228, \$5,187; 234, \$6,627 and \$5,167; 239, \$5,621.25.

Schedule 701, Steam Engineering.

Class 242, Philadelphia—Air compressor and spare parts—Bid 238, \$338.90.

The names of the bidders and the numbers under which they are designated in the above list are as follows:

Bid 55, M. T. Davidson Company; 60, Dow Pump & Diesel Engine Company; 100, Ingersoll-Rand Company; 110, Kemp Machinery Company; 129, Manning, Maxwell & Moore, Inc.; 154, Niles-Bement-Pond Company; 155, D. Nast Machinery Company; 156, Nordberg Mfg. Company; 161, Pratt Iron Works; 189, Sullivan Machinery Company; 228, Warren Steam Pump Company; 234, Worthington Pump & Machinery Corporation; 238, Westinghouse Track Brake Company; 239, C. H. Wheeler Mfg. Company.

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